THE PAPER INDUSTRY and PAPER WORLD

VOLUME 22
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JULY, 1940

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A. L. EKLUND,
Circulation Manager

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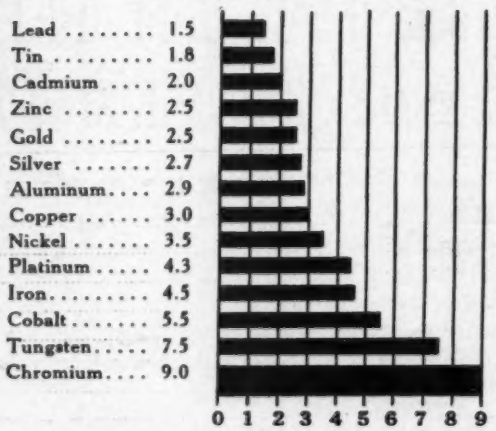
Comparative Hardness of Metals...

(MOH'S SCALE)



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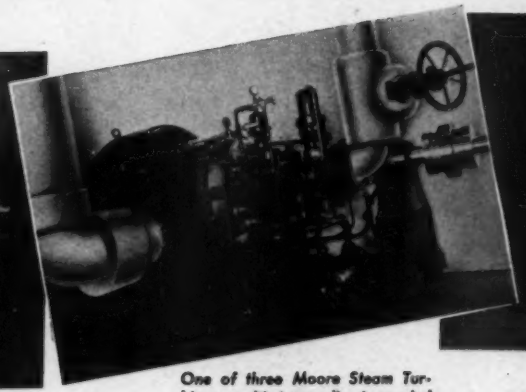
Paper Industry . . .

Three Moore Steam Turbines, driving boiler feed pumps

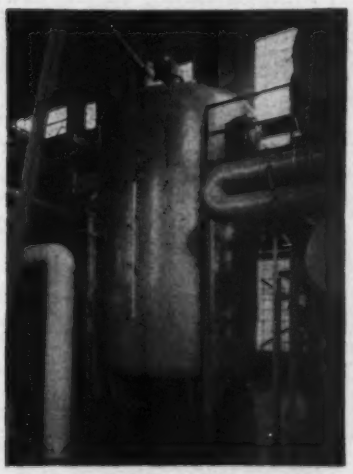


One of three Moore Steam Turbines, multi-stage, direct coupled into lineshaft, driving paper machines in a large mill in Canada

Worthington Type CH Centrifugal Pumps, pumping black liquor and salt cake to a recovery unit, in a large Southern mill

Worthington Turbine Well Pump, for main mill water supply

Worthington Air Compressor, 2-stage, direct connected to motor, for general air supply

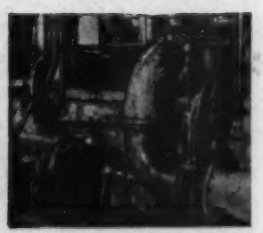


Worthington Deaerating Feedwater Heater, in power plant service

Worthington Type CT Worthite Centrifugal Pumps, on acid service

Worthington Type CG Worthite Centrifugal Pump, for handling alum

Worthington Rotary Gear Pumps, for viscous liquids



Worthington Type KE Elbow Propeller Pump, on white water service

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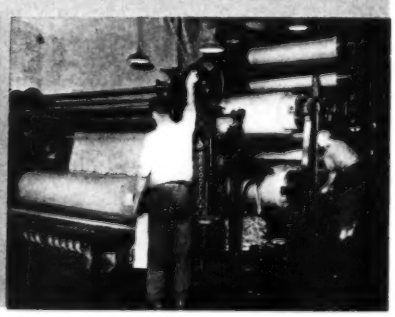
WORTHINGTON

The Spirit of America

True Americans are disciples of many cherished traditions. It may be having turkey on our national Thanksgiving Day; it may be the thrill of celebrating Independence Day with a display of fireworks; or many other American customs to which we cling. . . . But there are other traditions which bring us closer to the real "spirit of America," such as men who bare their heads in the coldest weather when the flag passes by; or that inborn patriotism that inspires even the lame to rise when the national anthem is played or sung. . . . And over this vast and glorious country as it is today shines a permanent rainbow which is really a benediction left there by generations of men who have given to this country the best they had. The nation is a monument to their ideals, and each generation of Americans is blessed by the lives of those great Americans.

To keep alive that "spirit of America," recruits are needed; industry must have wise and judicious leadership; skilled manpower is required to direct the manufacture of our machinery, equipment and products. Science can progress only under the guidance of genius; and educational institutions seek learned men to train the youth of the land. . . . The lives of two of the greatest of all Americans have become a living inspiration to men of every age and in every vocation. One thought left with us by the Father of our Country is as true now as then: "The name American must always exalt the just pride of patriotism." If every American clings to that "pride," then we shall continue to abide in the truth of the immortal words of that other Great American: "that government of the people, by the people, for the people shall not perish from the earth."



SOUTHERN KRAFT TO MERGE WITH I.P. COMPANY

▶▶▶ IN A SERIES of organization moves which will result in the direct ownership by the International Paper Company of over 93 per cent of all the properties controlled by it in the United States, it was announced that the Southern Kraft Corporation is to be merged into the former concern. This merger was announced along with additional news that International has filed a registration statement covering a $32,000,000 issue of first mortgage bonds due July 1, 1955. The merger would be effected prior to the issuance of these bonds.

The American Realty Company, which has extensive timberlands in New England, is being presently merged into the International Paper Company.

The proposed issue would be secured by a direct first mortgage on substantially all the operating properties and appurtenant timberlands to be owned directly by the International Paper Company upon completion of these mergers. Excluded from the lien of the mortgage are two small operating mills, five shut down jute board mills and certain timberlands and small properties none of which are considered important in connection with the company's operations.

The registration statement indicates that proceeds of the new bonds and of $12,000,000 new 6-year serial notes to be taken by banks and $8,000,000 first mortgage bonds of Hudson River Power Company to be placed privately with insurance companies, would be applied to retire substantially all funded debt of International Paper Company and its subsidiaries in the United States. The issues to be eliminated include International Paper Company's $14,257,000 5 per cent first and refunding mortgage bonds due 1947, $14,722,000 refunding mortgage 6 per cent bonds due 1955 and $13,210,000 secured sinking fund and serial notes, as well as Southern Kraft Corporation's $11,260,000 first leasehold and general mortgage bonds, 4¼ per cent series due 1946. The above amounts are the amounts outstanding at December 31, 1939. To date in 1940 they have been reduced to some extent by sinking funds, serial maturities, etc.

The International Paper Company first and refunding mortgage 5 per cent bonds due 1947 are the assumed obligation of Hudson River Power Corporation, formerly International Hydro-Electric Corporation, an International Hydro-Electric System subsidiary, which in 1931 acquired from International Paper Company the bulk of the paper company's directly-owned power properties. Hudson River Power Company will raise funds for the redemption of these bonds and of $335,000 in 6 per cent refunding mortgage bonds of Ticonderoga Pulp & Paper Company by sale to International Paper Company of $8,000,000 of 3½ per cent first mortgage sinking fund bonds due 1958 and $7,000,000 of 4 per cent second mortgage bonds due 1962. The registration statement indicates that the first mortgage bonds would be resold to insurance companies privately and that the second mortgage bonds would be held by International Paper Company. Applications for the governmental approvals necessary for these two bond issues have already been filed.

The funded debt of International Paper Company would be greatly simplified by this refunding operation. Upon completion of the financing, the only funded debt of International Paper Company and its United States subsidiaries would be the $32,000,000 new first mortgage bonds, the $12,000,000 serial notes and a few minor division obligations. Bonds of Canadian subsidiaries would remain undisturbed.

In view of present unsettled market conditions it is understood that the offering date has not yet been set but that the Company and the underwriters feel that it is advisable to file the registration statement in order to facilitate the offering of the new bonds to the public promptly whenever the necessary governmental approvals have been obtained and market conditions may permit.

◆

CHAMPION PAPER MILL AT HOUSTON IN OPERATION

Another milestone in the Champion Paper and Fibre Company's development in the South was marked by the beginning of operations of the company's paper mill at Houston, Texas. The new $3,500,000 plant started operations on June 22 to produce paper coated directly on the paper machine for national magazines and bond, envelope and tablet paper for the southwestern markets.

The bulk of the paper from the new mill will be used by Time, Inc., for *Life* magazine, for which Champion has contracted to supply part of the paper requirements. The Houston mill will add $400,000 to the payroll.

Champion's Texas pulp mill was built in 1937 on the Houston ship channel (cf. *The Paper Industry*, p. 303, June, 1937) which provides low cost water transportation for much raw material and for shipping products. The new Texas paper mill is an addition to the pulp mill and will manufacture paper on a straight line basis, utilizing part of the present-day facilities. The estimated capacity of the new paper mill addition is 120 tons per day of machine coated paper and other grades of uncoated paper.

SCOTT PAPER CO. ACQUIRES COOS BAY PULP CORP.

Acquisition of the Coos Bay Pulp Corporation, Empire, Oregon, by the Scott Paper Company, Chester, Pennsylvania, was announced recently by Thomas B. McCabe, president of the Scott organization. The latter company purchased the entire capital stock of the Oregon pulp company in accordance with an option secured April 27. Mr. McCabe stated that the option had been secured with a view to protect further the Scott Paper Company's raw material requirements for 1941.

The Coos Bay Pulp Corporation is located on Coos Bay about two miles from the Pacific Ocean. The mill produces unbleached sulphite pulp and has a rated capacity of about 22,000 tons.

In the announcement to stockholders Mr. McCabe outlined various steps

which the Scott Paper Company has been taking during the past several years with the view of developing domestic sources for the type of pulp used in the company's operations.

"To this end we have proceeded along three definite lines," Mr. McCabe pointed out. "First," he said, "in conjunction with the Mead Corporation, we have built and expanded the plant of the Brunswick Pulp and Paper Company; second; plans have been made to acquire an unbleached sulphite pulp mill on the West Coast, and third, the Scott research staff has for the past two years been working in co-operation with a number of pulp mills in the United States and Canada and as a result the company has available satisfactory domestic and Canadian sources of pulp supply and has contracted for a large tonnage of high quality pulp."

Mr. McCabe also announced that net sales for the first five months of 1940 amounted to $7,996,283, an increase of $1,200,310 or 17.7 per cent over the corresponding period last year.

◆

H. & W. PERSONNEL FOR MOBILE PLANT

The Hollingsworth and Whitney Company's new Chickasaw Mills, at Mobile, Alabama, are now nearing completion and are expected to be in production shortly, it was announced recently by M. L. Madden, president of the company.

The mills have been built under the supervision of Samuel D. DeForest, assistant to the president of H. & W., who has been in charge of the project since its inception. The abrupt changes in world conditions have just recently called him to South America in connection with markets for the company's products.

F. W. Mason, who collaborated with Mr. DeForest in planning the Chickasaw Mills and who has been assistant to Mr. DeForest during the construction, will remain at Mobile until completion of the mills. He has been promoted to the position of technical director.

It is announced that the operation of all of the mills of the company is under the direction of Robert Nivision, manager of mills, and that D. E. Cousins has been appointed resident mill manager of the Mobile unit. William Nivision has been appointed assistant to Mr. Cousins.

Further appointments include those of V. C. Watters to paper mill superintendent, R. F. Cuyle to pulp mill superintendent, C. A. Redden to chief engineer at Mobile, and F. B. Smith to power engineer. C. V. Riefenberg is to be office manager and H. C. Torbert will have the position of executive secretary to Mr. Cousins. R. F. Weston as chief forester will have charge of wood procurement.

The Chickasaw Mills include a pulp mill, bleach plant and paper mill. There will be both fourdrinier and cylinder paper machines. Unbleached and bleached sulphate papers will be manufactured.

◆

FINANCIAL

Paper mill securities in late June showed little change from the prices at the same time in May, though there have been advances and declines during the month. Wall Street trading is exceedingly light, indicating that speculators are not active, and that securities owners are following a waiting attitude.

Celotex Corporation—Net earnings for the quarter ending April 30 were $77,468, an increase of $55,000 over the earnings for the same quarter of 1939. The rapid change in the second quarter of the fiscal year as compared with the first quarter is shown by the fact that the first six months of the year show a loss of over $117,000. Sales in May were 40 per cent above those for April and 26 per cent above the sales for May, 1939.

Certain-teed Products Corporation—Net profit of $149,000 is reported for the first four months of 1940 as compared with a net loss for the same period in 1939 of $148,000.

Continental-Diamond Fiber Company—Net profits for the March quarter were $181,169, as compared with $17,309 for the same period in 1939.

Great Northern Paper Company—Net profit for the quarter ending March 31 was $688,249.

International Paper and Power Company—A dividend of $1.25 per share has been declared on the preferred stock, a similar amount having been voted for the first quarter.

Johns-Manville Corporation—A dividend of 75 cents per share has been declared payable June 24. In December a payment was made of $2 per common share.

Oregon Pulp and Paper Company—A deficit of $21,816 is reported for 1939, as compared with a deficit of $84,922 in 1938.

Oxford Paper Company—All of the bonds of the Oxford-Miami Paper Company amounting to $1,100,000 have been called for payment, to be refunded through a bank loan of about half the present interest rate.

Soundview Pulp Company—Net profits for five months of 1940 were $954,977 as against $106,862 for the same period of 1939.

West Virginia Pulp and Paper Company—Net profits for the six months ending April 30 were $1,366,844, as compared with $563,011 for the same period a year ago. Preferred and common stock will be sold from time to time without underwriting to an estimated return of $1,775,000, consisting of an authorized new issue of 7,411 shares of 6 per cent cumulative preferred and 43,920 shares of no-par common stock.

New York Stock Exchange—Stocks

	Closing Prices June 25 1940	May 25 1940
A. P. W. Paper Co.	*2–2⅜	2
Celotex	6	5⅜
Same preferred	*47–50	58½
Certain-teed	4	4⅜
Champion P. & F. Co.	21¼	19
Same Preferred	*96½–100	100¾
Container Corp.	11⅞	11¼
Cont. Diamond	6⅛	5⅜
Crown Zellerbach	14	13½
Same Preferred	83	78
Dixie Vortex	*10–10⅜	.....
Same "A"	*32¼–35¼	31½
Flintkote	12½	11¾
Robert Gair	2¾	2½
Same Preferred	12	11
Gaylord Container	9	10⅛
Same Preferred	*45–55	.....
International P.&P. Co.	12¼	12
Same Preferred	46¾	45½
Kimberly-Clark	*32¾–35¼	29¾
MacAndrews & Forbes	27	24
Masonite	23¼	23
Mead Corp.	9⅜	8
Same 6% Preferred	*71–75	.....
Paraffine Co.	28¼	29
Same Preferred	89½	.....
Rayonier	15½	14⅞
Same Preferred	27½	24⅞
Scott Paper	37⅛	37¾
Same Preferred	107½	110
Sutherland Paper	*21½–22⅜	20
Union Bag & Paper	10¾	10¾
United Paperboard	*3¼–3½	3½
U. S. Gypsum	52½	57½
Same Preferred	*172½–175	165

New York Stock Exchange—Bonds

Celotex 4½%	73¾	80
Certain-teed 5½%	73½	66⅛
Champion P. & F. Co. 4¾%	.....	104½
Container Corp 5%	.....	101
Inter. P. & P. 5%	.....	99½
Same 6%	98½	92½

New York Curb Exchange—Stocks

Am. Boxboard	4⅜	4⅛
Brown Co. Pfd.	*15½–17	16½
Det. Paper Prod.	.....	¾
Great Northern	42	38
Hummel Ross	*5⅜–6	5⅜
Nat. Container	*1½–2½	9
St. Regis	2½	2¼
Taggart	2⅞	3⅛
United Wallpaper	1⅜	1¾

*Closing Bid and Asked Prices.

"Sit down...you're rocking the boat!"

...YELLED THE SAILOR ON PAGE 57 TO THE INDIAN ON PAGE 58

"Me not Sitting Bull!" grunted the Indian. "Me mighty warrior from next page—big chief 'Show-Through'."

"Then crawl back to your reservation before you sink me!" cried the sailor, hanging on to the sides of the boat.

"Only paper manufacturer sendum back to tepee," said the chief, doing a war dance on the gunwale. "You writum letter. Tellum Krebs Pigments take show-through out of even thinnest paper."

"Look out!" screamed the sailor, "you'll tip us over..."

"Good tip—Krebs Pigments. Makum paper clean and white like paleface... bright like harvest moon ... printing stand out on both sides sharp as tomahawk. Krebs heap big medicine for dull-looking paper."

"Help!" roared the sailor as the boat began to sink.

"Ugh! Krebs medicine men help paper-maker on technical things, too..."

"I can't swim!" gasped the sailor.

"Not needum swim," replied the chief. "You just *writum!*"

KREBS PIGMENT & COLOR CORP.

1007 Orange Street...Wilmington, Delaware

INSTITUTE CONFERS HONORARY DEGREE ON CHARLES BOYCE

▶▶▶ CHARLES W. BOYCE, former executive secretary of the American Paper and Pulp Association, was honored on June 10 at Appleton, Wisconsin, when Lawrence College conferred upon him the honorary degree of doctor of laws during the 90th annual commencement exercises of the institution. Besides this degree and the honorary doctor of science degree awarded to Dr. George Harrison Shull, famous plant geneticist of Princeton University, thirteen candidates from the Institute of Paper Chemistry received their Ph. D. degrees and eleven their M. S. degrees. Lawrence College students, 103 in number, also received degrees.

In conferring the degree upon Mr. Boyce, President Thomas N. Barrows gave the following citation:

"In an era that has shaken most institutions and concepts, as the executive officer of one of the oldest and most significant trade associations, you have worked with calmness and intelligence; with a profound grasp of objectives and with a capacity for introspection that have given breadth and substance to industrial statesmanship. Your sound reflections on the fundamentals of an important industry have educated and stimulated others and you have demonstrated through democratic and parliamentary procedures, the efficacy of industrial co-operation and collective wisdom."

Mr. Boyce has been eminent in the field of forestry, especially as it pertains to the paper and lumber industries. He was executive secretary of the American Paper and Pulp Association for ten years, a position in which he did an outstanding job of directing the activities of this association of one of our major industries. He gave up this connection this year to enter the industry with the Northwest Paper Company, Cloquet, Minnesota.

Early in his career Mr. Boyce was a timber surveyor for the Canadian Pacific Railway and was also in the United States Forestry Service in this country and Alaska. During the World War he was commanding officer of the 69th Photographic Division and engaged in aerial reconnaissance flights. From 1921 to 1927 Mr. Boyce was in charge of economic studies in the pulp and paper and lumber industries studying the relationship between paper and pulp manufacture and the production of pulpwood. He is well versed in economics and his studies have been used extensively as guides in price settings and embargoes.

Those receiving doctor of philosophy degrees and the title of their theses are:

Carl Edward Ahlm, Minneapolis, Minn., "An Investigation of Thiolignin;" Henry Johnston Allison, Jr., Charlotte, N. C., "The Relation Between Surface Activity and Fiber Bond Strength in a Papermaking Pulp;" Raymond Emerson Baker, Salem, Ind., "Factors Governing the Strength Development of Kraft Pulps;" Paul Clay Baldwin, Tully, N. Y., "The Application of Photomicrographic Techniques to Problems of the Pulp and Paper Industry;" John William Bard, Antigo, Wis., "The Effect of Tannins on the Pulping of Wood and the Bleaching of Pulps;" John Calvin Bletzinger, Pittsburgh, Pa., "The Effect of Hydroxol Groups of Cellulose on its Papermaking Properties;" Loren Verne Forman, Ames, Iowa, "The Action of Ultraviolet Light on Lignin;" Karl Wilhelm Emil Fries, Dixfield, Maine, "Electrokinetic Phenomena of Aqueous Clay Suspensions;" Ralph Edmond Glading, Lorain, Ohio, "The Ultraviolet Absorption Spectra of Lignin and Related Compounds;" Harold Howard Houtz, Niagara Falls, N. Y., "The Colloidal Differentiation of Starches;" Gerald Gale Johnston, Dahinda, Ill., "The Mechanism Involved in the Methylation of Cellulose Acetate and of Cellulose Dissolved in Trimethylbenzyl Ammonium Hydroxide;" Leslie Lundgren Larson, Black Foot, Idaho, "A Study of the Lignin Residues in Unbleached and Partially Bleached Sulphite Pulp;" Herbert William Rowe, Dayton, Indiana, "A Fundamental Study of the Nature of Fiber Staining by Iodine Stains."

◆

BIOLOGICAL CONTROL COMM. TO MAKE SURVEYS

A series of mill surveys to extend the collection of scientific data will be supervised by the Biological Control Committee of the American Paper and Pulp Association as one phase of a program recently mapped out.

An item from the Association states that while there has been considerable discussion of the sanitary properties of paper used for packaging wet and dry foods, the Committee is convinced that there is much to learn about the

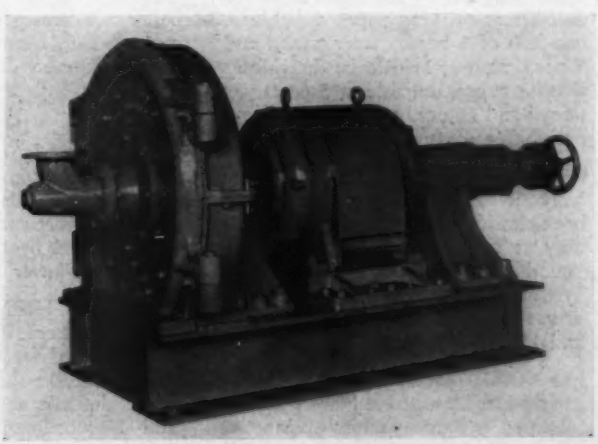
Left—Notables photographed immediately following commencement at Lawrence College, Appleton. Left to right—Dr. Max Otto, University of Wisconsin, who was commencement speaker; Charles Boyce, vice president Northwest Paper Company; President Thomas N. Barrows; and Dr. George Harrison Shull, Princeton University. Mr. Boyce received the honorary degree of LL. D., and Mr. Shull, eminent botanist received the degree D. Sc. Right—Westbrook Steel (left), executive director of the Institute of Paper Chemistry, and Charles Boyce.

Disc Mills are the Bunk!

You think so? Why? Had an unfavorable experience yourself perhaps. Or maybe you have a friend who has had.

Disc mills have been improperly applied. No question about that. But don't condemn the mill on that account.

On refining chips or rejects get our recommendations. We'll tell you honestly whether or not your requirements can be met with a disc machine. We've been making disc mills for fifty years—yet the Monarch Rotary Refiner is inherently different, distinctly better, specifically designed for pulp and paper mill service.



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subject. Good scientific information and research are required. Part of this can be accomplished in the laboratory while other aspects, particularly the effect of production variables, must be approached by actual commercial studies. The Institute of Paper Chemistry is working on the entire program and has arranged its personnel to handle the surveys as well as the laboratory investigations.

◆

CUSTOMS NEWS

▶▶▶ THE IMPORT COMMITTEE of the American Paper Industry announces that a test case involving twenty-five shipments of beer mat board, amounting to 400 tons, has been decided in favor of the Government, the United States Court of Customs and Patent Appeals finding that the merchandise had been undervalued about 10 per cent. The shipments were during the period from 1935 to 1937 inclusive, and protest against the action of the New York Appraiser had been carried to the highest Customs Court by the importer. The advanced value involved an additional duty of about $4,000 paid by the importer.

▶▶▶ THE UNITED STATES CUSTOMS COURT upheld the Government's classification of a shipment of Japanese printed writing paper imported at New York. The material was printed shipping forms, and classified for duty at 3 cents per pound plus 25 per cent as printed writing paper. The importer had claimed the shipment to be dutiable as printed matter of foreign authorship at 15 per cent.

▶▶▶ A LIGHT GREEN SWEDISH M. F. wrapping paper, composed of 65 per cent sulphite and 35 per cent kraft, probably bleached kraft, has been classified for duty as kraft wrapping paper, dutiable at 20 per cent.

▶▶▶ CHART PAPER FROM CANADA, claimed by the importer to be dutiable as printing paper duitable at one-fifth of 1 per cent per pound and 5 per cent, was held to be dutiable as writing paper, dutiable at 3 cents per pound and 15 per cent. This rate was prohibitive of further shipments.

▶▶▶ TWO IMPORTATIONS at New York of coated wrapping paper have been classified by Customs officials for duty as coated paper at 5 cents per pound and 15 per cent, though claimed by the importer to be dutiable as greaseproof paper at 3 cents per pound and 15 per cent.

▶▶▶ ONE IMPORTATION of diagram paper imported at New York was classified as a manufacture of paper at 35 per cent, though claimed by the importer to be dutiable at the rate, lower in this case, for printed writing paper of 3 cents per pound and 25 per cent.

▶▶▶ ONE SHIPMENT of transfer paper was classified for duty as coated paper at 5 cents per pound and 15 per cent, though claimed by New York importer to be duty free as duplex decalcomania paper.

▶▶▶ FOUR IMPORTATIONS at New York of Japanese tissue, copying paper, filter discs, and bibulous paper in sheets and rolls were classified for duty at 6 cents per pound and 20 per cent, claimed by the importers to be dutiable at lower rate as filter paper.

▶▶▶ ONE SHIPMENT of Japanese "cushion paper", imported at Chicago, was classified for duty at 6 cents per pound and 20 per cent, though claimed to be dutiable at 4 cents per pound and 15 per cent under the British reciprocal trade agreement provision for lower duty rates on stereotyping, carbonizing, and copying paper.

▶▶▶ A DUMPING COMPLAINT has been filed by the Import Committee of the American Paper Industry against the dumping of hanging paper raw stock imported from Canada and delivered to a New York state wall paper printer at $4 below the f.o.b. mill price in Canada.

▶▶▶ IMPORTS OF SIX SHIPMENTS of newsprint paper from Canada are before the United States Customs Court, docketed for trial in Duluth. All are of paper over the maximum weight of 35 pounds permitted for newsprint paper, two of the shipments weighing 35.48 pounds, two 35.72 and two 35.95. They are claimed by the importer to be duty free as standard newsprint.

▶▶▶ IMPORTS OF GROUNDWOOD PAPERS from Canada in April show

NEWSPRINT MADE FROM BIRCH AND JACK PINE

Last month, R. S. Kellogg, secretary of the News Print Service Bureau, sent out a sample of newsprint made in a test run at the Forest Products Laboratory, Madison, Wisconsin, last April. This newsprint was made from birch semichemical pulp and jack pine groundwood. The following facts regarding the manufacture of this paper were given by the Laboratory and mimeographed on the samples sent out by Mr. Kellogg:

"The furnish of this paper is 25 per cent birch semichemical pulp, 75 per cent jack pine groundwood. No clay or other filler was used, but some (violet) dye and size were added.

"The strength and other properties of the paper are as follows (comparisons with average values for some 28 commercial newsprint papers are given also):

	This Sample	Average News Print
Ream weight (25x40—500)	38.6	37.0
Thickness (0.001 inch)	3.21	3.21
Solid fraction	.45	.43
Burst factor	.23	.25
Tear factor	.41	.47
Tensile Strength	2860	2592
Stretch	2.35	1.00
Castor oil penetration (seconds)	89	48
Ash (per cent)	1.1	.....
Gloss (per cent)	36	42
Porosity (seconds)	82	52
Opacity (per cent)	91	92.5
Blue color (Ives)	66	58

"The birch semichemical pulp was obtained in better than 80 per cent yield, or about 2,500 pounds of air-dry pulp per cord. With birch at $10 per cord the cost of birch semichemical pulp should not exceed $23 per ton (slush form).

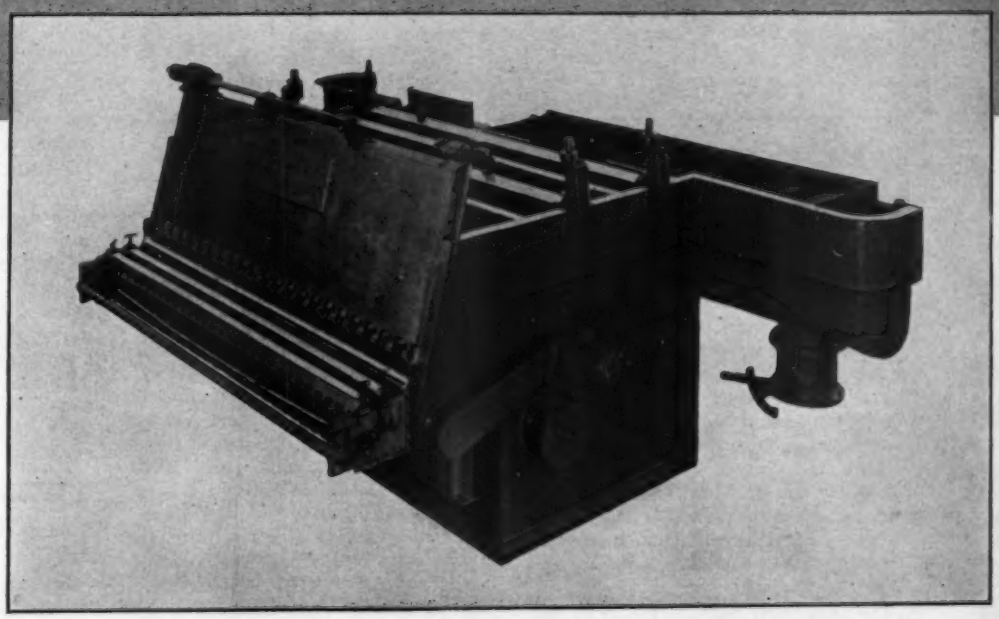
"This sheet was made on the Laboratory experimental machine at 100 ft. per minute. Some pitch trouble was encountered, traced directly to the jack pine groundwood. A similar paper made with spruce groundwood gave no pitch trouble.

"The jack pine groundwood required 66 horsepower days per ton power input.

"The furnish is rather tender in the wet condition and a little sticking was experienced at the presses. However, the strength factor of the semichemical pulp is quite good, the pulp used in the furnish showing a burst factor of 0.46 and a tear factor of 1.01 (basis 25 × 40 — 500) at a Schopper-Riegler freeness of 820. At a freeness of 460 (Schopper-Riegler) the same pulp developed a burst factor of 0.98 and a tear factor of 0.80.

"Similar papers have been made at the Laboratory from aspen semichemical pulp and jack pine and spruce groundwood, and from southern red and black gum semichemical pulps and southern pine groundwood. In addition to the possibility indicated for increased use of hardwoods for newsprint, the results appear promising for use of the cheaper semichemical pulps to replace the sulphite or semibleached kraft pulps now used."

....the latest in Flow Box and Slice design for light and heavy papers.



Shop view of the Improved Flow Box and Combination Slice Arrangement designed by Pusey and Jones. The Flow Box is constructed of copper clad welded steel with copper sheathed adjustable Baffles. The Combination Slice is of copper clad welded steel bronze fitted construction. A large perforated motor-driven rectifier roll, located in flow space ahead of apron, serves as current breaker and stock distributor.

This Improved Flow Box and Combination Slice Arrangement is one of the outstanding features of a Puseyjones all-purpose paper machine recently installed in a great new Southern mill.

The streamlined design of the Flow Box slows down the stock and prevents clogging even when handling large volumes. Assures uniform flow to the slice.

The Combination Slice permits of leveling and forming the sheet the full width.

The High Slice attachment is adaptable for the manufacture of light and medium weight papers at the higher speeds. It has an adjustable nozzle-type lip and is equipped with motor lift for quick handling.

The Auxiliary Slice attachment is adaptable for the manufacture of heavy weight papers at slow and moderate speeds and has adjustable orifice-type lip.

For complete information on the Improved Flow Box and Combination Slice Arrangement, write us today.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-making Machinery. Wilmington, Del.

the effect on prices of the depreciation of Canadian currency, and also the manner in which Canadian mills are absorbing the market for such paper formerly held by Scandinavia. Imports totaled 1,200 tons as against 800 tons for the same month of 1939, but the total value of the 1940 shipments was only $58,000 as against a value of $56,000 for two-thirds of the quantity in 1939. The depreciated Canadian currency is largely responsible for the reduced value.

▶▶▶ COLORED GROUNDWOOD PAPER imported from Canada in sheets through Minnesota ports was held dutiable as printing paper, and not allowed free entry as standard newsprint though in light tints.

▶▶▶ TWO IMPORTATIONS OF RELIGIOUS BOOKS from Belgium have been classified for duty at the rate provided for books in chief value of bible paper. One shipment of prayerbooks from Belgium, claimed to be dutiable at 7½ per cent as prayerbooks, was classified on the opinion of domestic manufacturers as being printed on paper known to the American industry under the present Tariff Act as bible paper, and thereby dutiable at 2 cents per pound and 10 per cent on the bible paper portion of the books. A second shipment was then made of paper of slightly inferior quality, but on the opinion of domestic producers of bible paper this also was classified at the bible paper rate. Samples of both shipments were submitted to American bible paper manufacturers by the Import Committee of the American Paper Industry at the request of the United States Customs officials.

▶▶▶ COPYING TISSUE PAPER, classified for duty at 6 cents per pound and 20 per cent, is claimed by the importer at Boston to be dutiable under the Canadian reciprocal trade agreement at 2½ cents per pound and 7½ per cent. To be dutiable at this rate the paper must be valued at not more than 15 cents per pound, and to be dutiable at an alternative claim under the British trade agreement it must be stereotype, carbon or pottery paper.

NEW ENGLAND PULP NEWS

Paper mills of New England were not unduly disturbed by the report that the Intercoastal steamships were threatened with a strike. Since the freight rate on wood pulp from the West to the East coast was upped to 40 cents a hundred pounds, many paper mills have been receiving their pulp all-rail at the transcontinental rate of 50 cents a hundred. Since the war began, the service via steamer has been diminished by sale or withdrawal of many steamers to more profitable hauls elsewhere. The backhaul from tidewater to many mills offsets the saving in the port-to-port water rate.

On the other hand, the scarcity of spot kraft and unbleached sulphite has caused considerable concern. One New England mill has been compelled to curtail operations sharply. Others have paid $80-$85 for bleached sulphite, $72-$75 for unbleached sulphite and from $65-$72 for kraft. Lots of unsold pulp available ranges in size from 150 to 400 tons. Often the price the converter must pay (and this applies to both board and paper mills) is more than he can realize for his board or paper after conversion. Invariably it is far more than cost plus manufacturing expense. Hence, only by a more careful use of waste paper, domestic and spot lots can a profitable turnover be achieved.

It is expected that by September the situation will really get serious for some mills unless some method is discovered of securing more pulp from Scandinavia. Increased imports from Canada are not feasible so long as Britain is demanding large tonnages, although there has been some gain in Canadian shipments.

Wet groundwood has been sold by New England mills at $35 f.o.b. grinders. This material was sold by mills not accustomed to selling groundwood on the market and not having the drying capacity to handle this trade under normal conditions. New England board and tissue mills have been utilizing considerable side-run newsprint from Canada as a substitute for groundwood. During the second quarter this cost $37.50 delivered. Starting July 1, the price was raised $5 to $42.50 delivered. Southern kraft pulp on spot has been sold at $70-$75 delivered New England mills.

British buyers have taken over some of the pulp and paper orders which had been allotted to New England mills by the French buying commission. Thus the big pulp orders which the Brown Company was filling, the egg trays which the Keyes Fibre Company were shipping to Denmark and the fine paper orders which some of the Connecticut Valley rag content mills had with France, have been diverted to Britain. However, many New England companies have had orders elsewhere in Europe which the war has interrupted and the increased South American business has by no means made good this deficit.

WIS. RIVER FLOOD AFFECTS PAPER MILLS

On June 25, the Wisconsin river reached a stage of 11.46 feet at Wisconsin Rapids, the highest since September, 1938, and effected operations at the Biron mill of the Consolidated Water Power and Paper Company and the Port Edwards mill of the Nekoosa-Edwards Paper Company.

The heaviest rains in years, more than two and a half times the forty-four year average for the month, raised the river as much as six inches in four hours at times, finally reaching the high flow of 51,300 cubic feet per second.

At the Biron mill the high water caused the pulp mill to shut down for half a day, and No. 2 paper machine was also down for a like period, according to Warren Beadle, mill manager.

At the Port Edwards mill Number 5 and 6 paper machines were shut down for slightly more than a day. The high water carried away the flash boards at the Centralia, Port Edwards and Nekoosa dams of the Nekoosa-Edwards Paper Company.

According to Nepco's engineer, E. P. Gleason, the high water was an entirely normal flood. Mr. Gleason pointed out that the flow of 51,300 cubic feet per second was considerably below the 69,500 cubic feet recorded during the September flood in 1938.

A record rainfall of 6.44 for June 22 through 24 established a record for the heaviest rainfall at Nepco Lake since its building about 14 years ago.

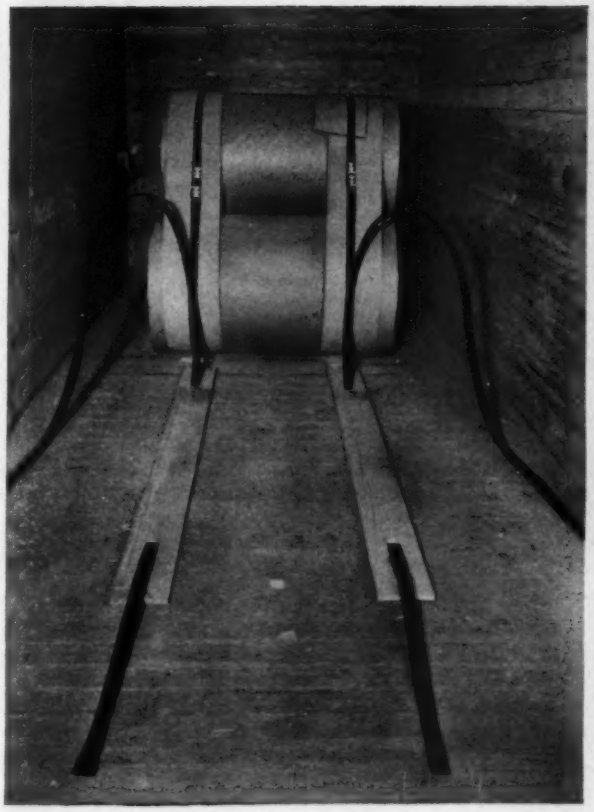
◆

TWELVE PAPER COMPANIES ARE INDICTED

As this issue closes, there is a press report that on July 5 a federal grand jury in New York had indicted the American Pulpwood Association and twelve large paper companies for conspiracy to violate the wage and hour act.

The twelve companies listed in this report are:

Brunswick Pulp and Paper Company
Champion Paper and Fiber Company
Gulf States Paper Corporation
Johns-Manville Products Corporation of Virginia
The Mead Corporation
National Container Corporation
North Carolina Pulp Company
Southern Advance Bag and Paper Company, Inc.
Southern Kraft Corporation
St. Joe Paper Company



WHY SHIPPERS USE THE ACME SKID-CHECK METHOD

In shipping rolls of paper, one of the principal sources of damage in carload shipments is chafing caused by vertical oscillation of the individual rolls. You can easily avoid this headache by the use of the new Acme Skid-Check Method . . . a scientific and proven remedy for chafing in transit. As full details of this procedure are not disclosed in the above illustration, mail the coupon for a complete outline of the application. Here is the solution for which the paper industry has been seeking . . . so write today!

ACME *Unit-Load* PROCESS

To assure every shipment of rolls, skids or other packs arriving at destination in perfect condition, many shippers use the Acme Unit-Load Process—a quick, inexpensive, simple bracing procedure. It eliminates unnecessary and costly bracing materials—reduces freight charges (less tare weight)—lowers labor costs and eliminates damage claims. The coupon below will bring you full information on Acme's better ways of bracing shipments.

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The Acme Steelstrap Process of making skids, cases, cartons, bundles, bales "Bound to Get There" assures increased profits . . . safeguards customer goodwill . . . saves time and material and provides adequate protection at minimum cost. If you are interested in effecting important economies in your handling and shipping, mail the coupon today for the illustrated booklet "Stopping Profit Leaks." There is no obligation.

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- ☐ Send full details on the Acme Skid-Check Method.
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- ☐ Send a copy of "Stopping Profit Leaks Beyond the Production Line."

Name.....

Address.....

City.....*State*.....

Union Bag and Paper Corporation
West Virginia Pulp and Paper Company

The indictment, so says the report, is based upon the assertion that the Pulpwood Association and the twelve companies agreed to pay employees on a piece-rate basis which would have permitted the employee to earn the minimum hourly wage provided by the law. However, the claim is that the work actually done did not amount to as much as the minimum wage and that no supplementary compensation was given.

Since this announcement was made, there has not been time to learn any of the details of the case, but the report as published in the daily press quotes George H. Mead, president of the Mead Corporation, as not being concerned over the charges.

◆

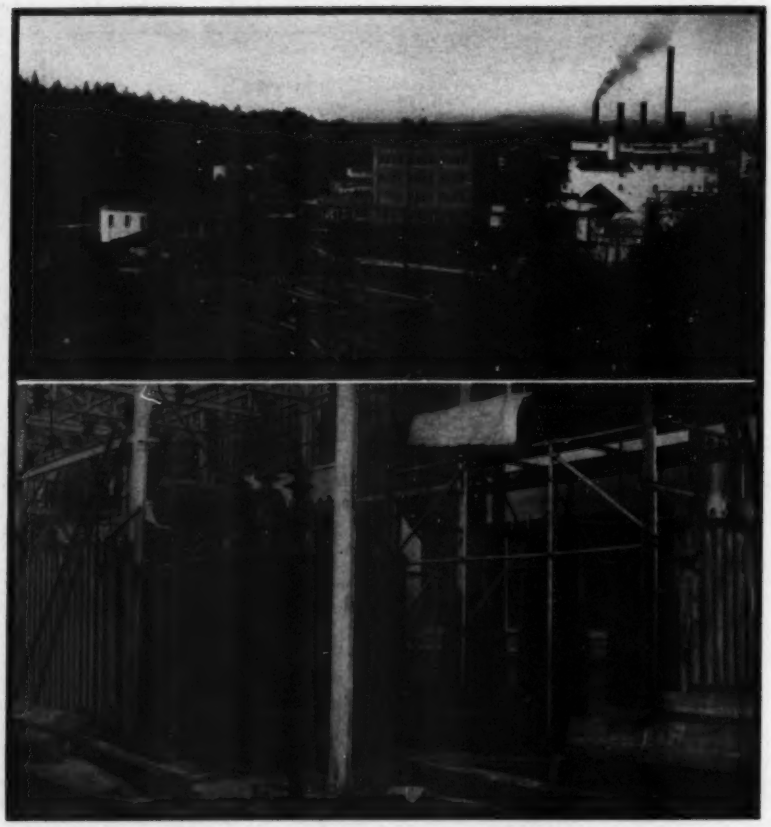
HAWLEY CO. ADDS ELEC. EQUIPMENT

Steadily increasing operating schedules have made necessary the installation of considerable new equipment on the part of the Hawley Pulp & Paper Company, Oregon City, Oregon. One important piece of equipment is a new 2000 kv.-a. "Pacific" type three phase transformer, manufactured by Wolff & Company, Portland. This transformer reduces the line voltage from 57,100 to 2300 volts. As shown in the accompanying photograph, it is being installed at the end of the present substation. The three small transformers in the rear will be moved over to make room for it. This new transformer will constitute one whole new bay in the outdoor substation, with its complement of buses and switching equipment.

At the Hawley plant, much of the wood pulp is ground by water power direct. But aside from this operation, electricity is used largely. Part of this power they develop by water, to the extent of 2500 kw. capacity and in addition they operate a 300 kw. steam unit. Both are being used at full capacity at present.

Over and above this 2800 kw. per hour of their own production, they are now buying 6000 kw. per hour from the utility, having their substation on the premises for stepping down to operating voltage.

There are 550 pieces of rotating electrical equipment in the plant, a-c. and d-c. The largest motors are for processing and pulp grinding. They are of 1000 hp., although a new one of 1250 hp. is about to be installed. All large motors are operated at 2300 volts. Motors under 50 hp. are on 440-volt circuits.

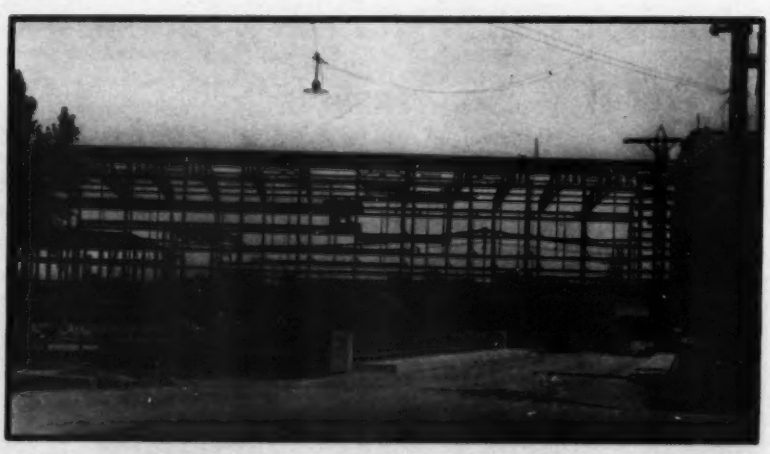


Above—General view of the Hawley Pulp and Paper Co., Oregon City, Ore. Below—New 2,000 kv-a. transformer being added to the substation of the Hawley plant.

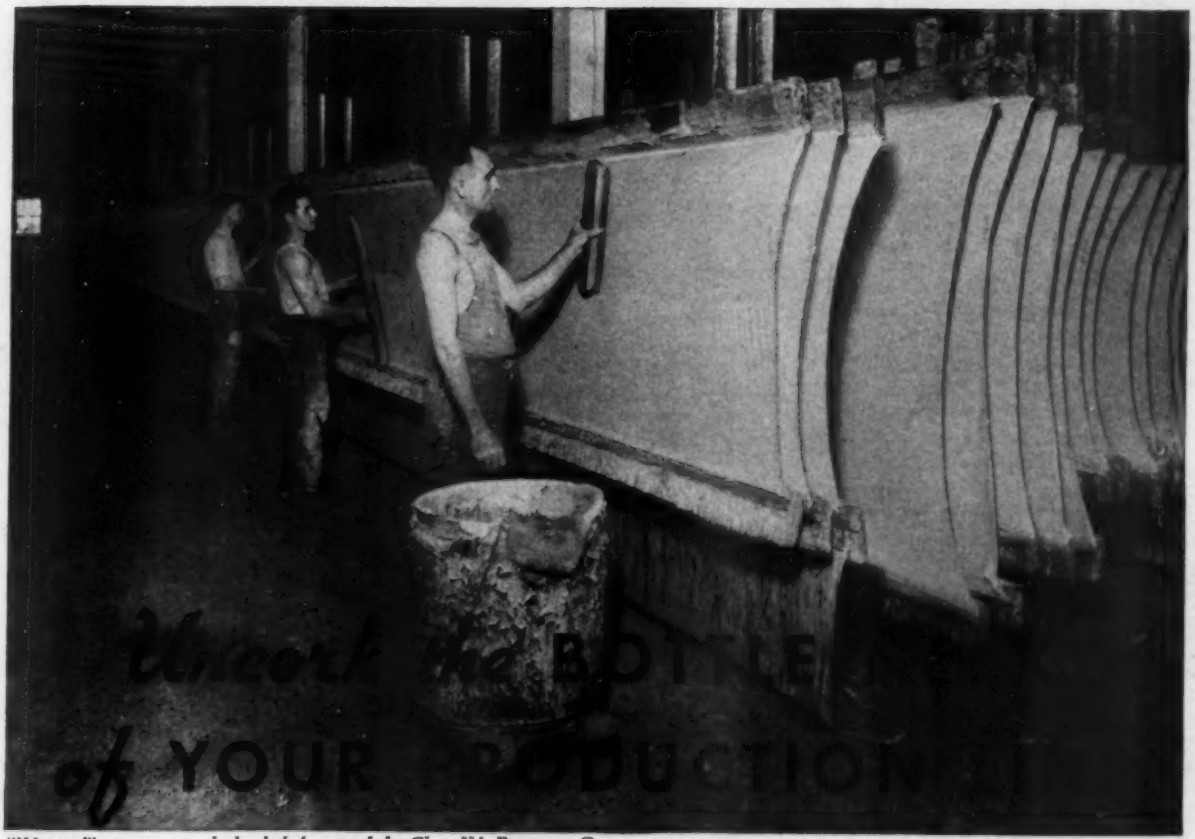
NEW K-C UNIT WELL UNDER WAY

Construction work is well advanced on the new coarse wadding plant of the Kimberly-Clark Corporation at Neenah, Wisconsin. All of the steel work for the four-story structure is in place and other work is progressing rapidly.

The building is located just west of the main offices and adjacent to the canal, recently spanned by a new steel and concrete bridge which was built by K-C as a truck and car outlet for its employees and as an approach to the new plant. When completed the coarse wadding activities, now carried on at Niagara Falls, will be moved to Neenah.



Steel work is finished on the new coarse wadding plant of Kimberly-Clark Corp., at Neenah, Wis.



"Wet end" operation in shade cloth factory of the Chas. W. Breneman Co.

In the manufacture of paper as in the making of window shade cloth, the drying operation is the bottle neck of the production schedule.

The first operation in converting cotton sheeting into shade cloth consists of sizing the fabric with glue dissolved in water. The cloth that is sized this morning must be dry by tomorrow noon. Then it will be painted. The paint must be dry by the following morning. The cost of fuel needed to develop the heat for drying size and paint is reflected in the price you pay for every window shade.

The paper maker must remove more water in a minute than the shade cloth manufacturer removes in a day. The more water you extract at the wet end of the machine the less heat you will need at the dryers. Hamilton Felts remove more water *faster*—deliver dryer sheets at higher speeds. Hamilton Felts uncork the bottle neck of the production line and plug the leaks in your coal bin.

From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

M. AND O. LAUNCHES LARGE-SCALE REFORESTATION

Reforestation on a large scale is being undertaken by the Minnesota and Ontario Paper Company which is extending this project to the International Falls (Minnesota) vicinity in co-operation with the Minnesota Division of Forestry and the United States Forest Service.

The first step in the M. & O. reforestation project was taken in 1936 when 36 acres of cutover and land formerly under cultivation was planted with jack and red pine seedlings.

Wishing to extend its program to additional company lands which were idle and unsuited to other purposes, the company this spring planted 65,000 trees on a 55-acre tract just east of the city limits near Rainy River. Four varieties of coniferous trees were planted on this site; red, white and jack pine and white spruce. The seedlings were supplied by the Nekoosa-Edwards nursery at Port Edwards, Wisconsin, and the Bear Creek nursery at Alida, Minnesota. Extensive soil and grub tests were applied to determine suitability for reforestation.

Previous counts at the original site gave the following high survival percentages one year after planting:

Norway pine	90 per cent
White pine	83 per cent
Spruce	73 per cent

Jack pine appears to be the species most easily adapted to reforestation endeavors. These trees reach a merchantable size in about 40 years, compared with a much longer period required for the other varieties of pine and spruce.

Federal and state forestry experts are reported as being intensely interested in the Minnesota and Ontario project and see in it an example of what might be done to preserve the value of cutover lands and to guarantee the future of northern Minnesota industry.

Frank H. Bussman, logging superintendent, and Fred Boeckh, graduate forester, are in charge of the project, Robert Olson, foreman, is in charge of planting operations. Robert Sowash, superintendent of the Cass Lake Federal Nursery co-operated with M. and O. officials in planning the new tree plantation.

Many local residents are interested in this new project as they see in it a remedy to the tax delinquency problem and also because its success would assure a permanent supply of forest products for the state's industries.

VELDOWN BUSINESS TO CELLUCOTTON

The Veldown Company has just completed negotiations for the sale of its sanitary napkin business to International Cellucotton Products Company with offices in New York, Chicago and San Francisco. The latter company also handles the distribution of Kotex.

The actual transfer will take place on or about October 1, after which the same napkin will be available in substantially the same package from the International Cellucotton Products Company. The Veldown Company will continue the manufacture and sale of cleansing and toilet tissue.

◆

WAGE AND HOUR RULE—PAY FOR REST PERIODS

Employees coming under the provisions of the Fair Labor Standards Act must be paid for short rest periods, according to an announcement on June 10 by Colonel Philip B. Fleming, administrator of the Wage and Hour Division, United States Department of Labor.

This "short" rest period, as construed in instructions sent to all field representatives of the division, will include periods up to and including 20 minutes. When rest periods customarily taken by employees are longer, final decision on whether or not the employee will be paid for it will rest with the Regional Director.

◆

FINLAND'S PULP INDUSTRY NOW NEAR NORMAL

The pulp mill situation in Finland, in regard to operations, has returned to normal, a recent report stated. Labor and pulpwood supplies are now available and the power situation is nearly normal, although it was indicated in a cable received by the American Paper and Pulp Association, that fuel supplies may be curtailed.

It was stated that stocks on hand plus intended production for 1940 will make available for export 50,000 tons of sulphite pulp and 300,000 tons of sulphate pulp. The shipping problem is the most uncertain and serious factor.

Petsamo is an open port but lacks rail and harbor facilities and it is reckoned that only about ten per cent of cellulose exports can be handled there. The route of the Falsterko Channel is not considered practicable because of lack of assurances by belligerents that ships will not be molested. The same situation applies to the Kiel Canal. Making shipments via Odessa is being looked into, it was said, but there is little chance of using this route.

The American commercial attaché at Helsinki pointed out that he has been informed that practically no wood pulp will go to belligerent countries.

◆

IMPROVEMENTS AT FIBREBOARD PRODUCTS PLANT

Work started in mid-June on a $40,000 improvement project at the Fibreboard Products Corporation's unit at Port Angeles, Washington. The company is replacing the roofs, including supporting posts and trusses, of the beater machine and finishing rooms.

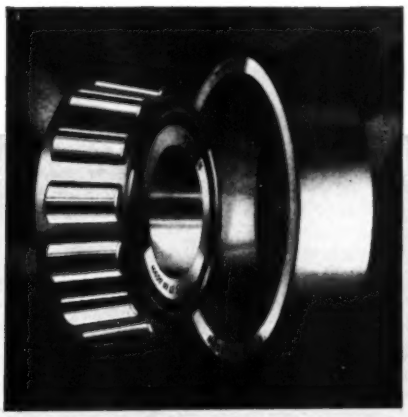
Production operations at the mill are continuing while this construction work is in progress. False ceilings have been erected to protect machinery and to screen the construction workmen from the heat of plant operations. The company is handling the work with its own personnel and a few temporary additions of skilled workers.

◆

CHICAGO MUSEUM ADDS DISPLAY OF IND. CHEMICALS

Among several new exhibits at Chicago's Museum of Science and Industry is a room full of rather spectacular displays showing typical chemical reactions, procedures and processes such as the burning of iron in oxygen, the making and burning of gunpowder, potassium burning on water, the violent heat reaction of thermit, growing crystals by electricity and many other chemical experiments. Industrial applications of chemistry are illustrated, including the manufacture of salt, phosphorus and phosphates; Carborundum and Aloxite abrasives, industrial alcohol, carbureted water gas and coal gas.

These exhibits are merely a part of a new series of exhibits in the chemistry sequence, Dr. C. Robert Moulton, curator of chemistry, announced. Other rooms are devoted to various aspects of chemistry historical and otherwise.



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SECOND, LONG EXPERIENCE IN APPLYING THE BEARING TO MEET THE PROBLEMS OF ANY TYPE OF EQUIPMENT

Timken has successfully applied bearings to every kind of mechanical equipment. It takes several years to thoroughly prove the successful use of bearings in meeting the individual specialized problems of any given condition of service. Timken's vast fund of experience takes the guesswork out of bearing application.

When you install TIMKEN Bearings you are not experimenting. You get both of these two important basic factors that are so necessary for dead-sure, satisfactory bearing performance: *first*, correct design, material and construction; and *second*, 42 years of engineering experience in applying bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

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ADVERTISING PAGES REMOVED

▶▶▶ WORK WILL START SOON on the construction and installation of a rotary fish screen at the head gate of the water supply of the Crown Willamette Paper Company, Camas, Washington. The three-mesh wire screen will prevent escapement of even the smallest fish from Lackamas Lake into the mill's two-mile ditch. The installation is being made in co-operation with the Washington State Game Commission to make Lackamas Lake a fine trout and bass lake.

◆

▶▶▶ CONSUMPTION OF NEWSPRINT in May in the United States increased 11.1 per cent over May, 1939, it was reported recently. This was the largest for any May for the last ten years with the exception of 1937 and the largest for any month since October, 1937.

◆

▶▶▶ CONTRACT FOR THE CONSTRUCTION of the $250,000 paper mill being built in Winnipeg, Manitoba, by Building Products, Ltd., has been awarded to the Beaver Construction Company. Construction has started and the new plant is scheduled for completion by next October. The new mill is expected to serve the building industry in western Canada.

BRIEFS

▶▶▶ HUMMEL-ROSS FIBRE CORPORATION has announced the licensing of the Hinde and Dauch Paper Company, Sandusky, Ohio, and the Hinde and Dauch Paper Company of Canada, Toronto, under the United States and Canadian patents for the use of the secondary head box. This in addition to previous licenses issued recently (cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 124, May, 1940).

◆

▶▶▶ NEW EQUIPMENT is being installed in the Port Arthur (Ontario) mill of Provincial Paper Mills. This will enable production of an improved quality of book and catalogue papers and a higher production of sheet papers.

◆

▶▶▶ A FLAT WAGE INCREASE of two cents an hour in all wage rates was announced June 21 by the Thilmany Pulp and Paper Company. In addition to this announcement, L. C. Smith, personnel director, stated that the company will grant vacations with pay to employees who have been with the concern for three or more years. One week's vacation with pay is granted those of ten or more year's service while those of less than ten but more than three will receive three days with pay.

◆

▶▶▶ A NEW ADDITION is to be erected by the Howard Smith Paper Mills, Montreal, it is reported. Cost for the new addition, including equipment, will be about $75,000.

◆

▶▶▶ BIRD AND SON, INC., is completing the installation of special wood chipping and wood pulping equipment at its roof felt mill in Phillipsdale, Rhode Island. It is understood that this will produce a specially-prepared mechanical wood fiber which will be used as a partial substitute for either rags or waste paper or both. Other roofing mills have previously installed equipment of this general nature as a partial substitute for rags.

◆

▶▶▶ BECAUSE OF THE FACT that the name, California Fruit Wrapping Mills, Inc., did not fully identify this company as a paper mill, it has been announced that the name has been changed to Fernstrom Paper Mills, Inc. The company was started about fifteen years ago, chiefly for the purpose of manufacturing tissue papers converted into fruit wrappers for domestic use and export. At present the company manufactures many kinds of tissue papers and waxing papers, besides fruit wrappers.

◆

▶▶▶ MULTICOLOR PACKAGES, INC., has taken over the former Rogue River Paper Company, Rockford, Michigan, and will manufacture chip board and convert it into laminated paper barrel staves. The company will also, for the time being, sell the surplus stock of board. E. P. Everett, president of Everett Industries, Inc., Rockford, is in charge of the mill.

◆

▶▶▶ ONE OF THE LEADING paper bag manufacturers advanced prices approximately $8 a ton to about $112, a press report stated recently. Speculative demand for paper has quieted since the French peace bid but regular customers show no hesitancy in placing orders, it was said. The spread between the higher price for paper bags and kraft pulp was less than the spread a year ago when prices were considerably lower, it was observed.

Reduce Production Costs!

●

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PATENTED NON-CRACK SELVEDGE

It Lies Flat—Eliminating the Sewing of Cracked Edges

With our Patented Process in the weaving of this wire the strain does NOT come on the edge of the wire. A trial of this wire in your mill will convince you of its advantages.

Write for Samples

PURVES MACHINE WIRE CO., INC.
HOLYOKE MASS. U. S. A.

Editorial ★ ★ ★

America's Reaction to the War

▶▶▶ THE MONTH OF JUNE, 1940, witnessed the most momentous events of modern times. Events which will have tremendous influences on the economic trends of business and commerce in the entire world.

The collapse of a friendly nation as a fighting force in the allied defense against invasion was so swift and unexpected that it roused the whole world to the immediate menace of dominance.

England alone, separated from the continent of Europe only by a moat twenty-two miles wide at its narrowest span is, at this writing, undominated. Such a state of affairs was not dreamed of ninety days ago.

What will eventuate within the next thirty days is beyond the ken of the ablest predictor. Whether England can be conquered speedily, eventually, or ever, is at present an unpredictable event. There are still too many uncertain factors which permit justifiable doubts.

In any event, the fighting and battling in Europe is still going on. The longer it continues the more certain becomes the exhaustion of all its economic wealth and resources, leaving it an easy prey to consequent famine, pestilence and revolution. What then?

The fall of a democracy brought about an unparalleled reaction in this country. As a consequence, the people of the United States never have been so thoroughly and dramatically stirred. They demand immediate action for national defense. Congress and the Executive were positively driven to appropriate billions by the petition of taxpayers. The country never has been so emphatic in its demand for adequate leadership and protection. As an instance, the convention at Philadelphia was literally taken out of the control of politicians and by popular demand the best executive and the most outstanding industrial leader was nominated for president. "Who," the people said, "should lead and direct the energies of the country at this time?" "The best industrialist we have! Not a politician, nor a lawyer, nor a professional man, but the best organizer and fighter for unified industrial defense operations." So they chose Wendell L. Willkie in the most dramatic election that any candidate for president ever knew.

Now all these happenings affect business. Already there have been sufficient prospective production plans made to keep the wheels of our factories whizzing at full capacity for several years to come. Nothing short of complete preparedness will satisfy the American public, cost what it may.

New factories must be built, new tools made. Huge battalions of men must be employed. In fact, the only drafting that the manhood of this country is liable to see is the drafting of men into industry, not for war.

Look at the situation. For seven years the charge-off for depreciation of our industrial equipment has been going on without replacement. For seven years our industrial machines have been allowed to sink into obsolesence. For seven years private industry has been going out of business.

Now, with the biggest program for industrial production this country has ever experienced immediately before us, we are confronted with the lowest industrial efficiency in a generation.

The people of America know this. They realize what they are up against, but they are demanding that industry and Government get together and do something about it. They will pay for it. That is the situation in this country today and it constitutes the biggest expansion of business volume and business activity this country has ever known. Nothing can stop its progress to fulfillment, though it take ten years.

It was the month of June, 1940, that saw the United States of America finally awakened and galvanized into intense activity for adequate national defense. For it is adequate national defense that is to protect our national wealth and economic resources. It is our national wealth and economic resources, when adequately protected, that will permit the United States of America to save itself and the world from ultimate wreck and ruin.

In all this program, the paper industry has an important part.

Muffing It

▶▶▶ WHY IS IT SO HARD for many of us to appreciate the importance of the thoughts and efforts of others if perchance they are different from our own. Maybe an opinion is expressed that is a little contrary to generally accepted thought, and our immediate reaction, possibly not audibly, is to the effect that it is not so. Maybe a new technique for improving process operations or for the making of a superior product is explained, or the concept of a new machine for relieving some bottle neck in mill operations is described and we see nothing in such description. Perhaps, we go so far as to state that, whatever the development, it will not work, and then we proceed to enumerate reasons, one after another, why it is no good.

It is realized there is often much chaff in the wheat, and sometimes it is difficult to separate that which is good from that which is not. Nevertheless, it is believed we should not be quite so prone to condemn the practicality of ideas or developments of any kind unless we are fully conversant with the numerous variables incident to them.

Only a few years ago, it was the commonly thought in the trade that southern pine was not a suitable raw material for paper production. Then it began to be used for kraft wrapping and bag papers with the result that the critics altered their position somewhat by saying, "Yes, southern pine is working out fairly well for wrapping and bag, but it is not suitable for white papers." Now, sulphate pulp produced from southern pine is being bleached and used in the production of printing and other high grade papers; southern pine is being ground and the groundwood pulp mixed with bleached southern pine sulphate pulp in the manufacture of newsprint; then, too, bleached sulphite pulp from southern pine is being produced for consumption in the rayon industry.

The growing use of southern pine as a raw material for pulp and paper (755,175 cords in 1927—2,658,949 cords in 1937) is proof of the wisdom expressed in one of the poems of the late Douglas Malloch: "Don't You Be too Sure too Soon."

ADVERTISING PAGES REMOVED

CURRENT THOUGHT

WHERE IS THE "OLD COUNTRY?"

WILLIAM SIBLEY

▶▶▶ WHERE IS THE "OLD COUNTRY?" Foolish question' Most of you will answer: "On the other side of the Atlantic Ocean, of course. Columbus didn't discover the Americas until the 'old country' had gained a 1492-year head-start on us even by the time they began to count time the right way. Even a school kid would know that!"

Well, here is something neither the schoolkids nor their parents know: the United States of America is the oldest country on earth. Where is the "old country"? The "old country" is *here*. Columbus came over here in 1492. That was 448 years ago. Subsequently we went through a colonization period of 284 years, which brings us up to 1776, when we declared the War of Independence. That was 164 years ago. In 1789, we established the United States of America. That was 151 years ago. And 151 years is the longest time any government on earth has remained unchanged. Even England's government has undergone major changes since 1789.

The United States was over eighty years old when Germany was born out of a hodge-podge of quarrelsome principalities (thanks to Bismarck). But even Bismarck's empire crashed in 1918 and was supplanted by a totalitarian state. Italy didn't become a united nation until 1870, and even that government didn't endure past 1922. When Benjamin Franklin was our ambassador to France, that country was an absolute monarchy, and since then the government has gone through a revolution, two empires, a restored monarchy, and two different kinds of republics.

Let's get away from the idea that this is a young nation which must revere its ancestors in Europe. Let's start now to pin back the ears of ill-informed editorial writers or high-hat Europeans who infer we are striplings brave enough to go out on the prairie and shoot buffalo. We are old enough to have stood on the solid foundation of our Constitution and watched the other nations come and go. Because, during our 151 years of continuous existence, Russia has undergone two complete changes. We watched Portugal swing from an absolute monarchy to a republic; Spain from pillar to post to platform. Sweden didn't establish her present constitution until 1809; and Holland has been entirely reconstituted. So has China. So has Japan and Siam, whose old monarchies adopted revolutionary constitutions after we were a hundred years old.

Switzerland, Liberia, Belgium, Norway, Bulgaria, Rumania, Finland, Latvia, Estonia, Lithuania, Austria, Hungary, Yugoslavia, Poland, Czechoslovakia, Denmark, the Transvaal Republic, plus all the South and Central American nations—we have seen born (and some die). All these and more were established after 1789. Indeed we were more than thirty years old when Greece won her independence, and we were far older when Turkey cleaned house.

All of which means what? It means that we should be throwing away the finest heritage ever given to man if we listened to the political philosophies of *any* European nation. Their governments, their political ideologies, are only ten, twenty, thirty, fifty, or eighty years old. And that isn't old enough to prove to *us*, the "old country," that their philosophies are better then ours. Listen:

One hundred and fifty-one years ago a few thousand people, young on this Continent, became wedded to Liberty. Straightaway, they began the rearing of children, whom they called: Opportunity, Equality, Justice and Happiness. Having imposed upon themselves the responsibility of a family they took out an insurance policy. This policy was the Constitution, and like all insurance policies, it was designed primarily to care for the children. And like all insurance policies, this one cost a great deal. To make the payments and keep this constitutional insurance policy in force, they had to pay, at great sacrifice, such premiums as the War of 1812, the Indian Wars, the Civil War, and many other payments equally exacting and hard to meet. *But they met the payments, and kept this policy in force.*

And it is this constitutional insurance policy that has kept the nation in force, too. Our Constitution, with its Preamble, is unexampled and unparalleled for soundness and depth of import. The proof of that statement lies in the fact that the United States is still here, unchanged, and other nations are not. Too many of us think of our Constitution as being a "law". It is not a law in the commonly accepted sense of the word. It is far more. It is a basic premise—a principle. The Constitution is an organic law, whereas a statute is merely the application of that law to human conduct. The Constitution is the basic alphabet—not the spelling of a word. The Constitution is the Golden Rule—not the various interpretations such as the Ten Commandments. It is the basic ten digits, not the working of a problem in partial payments. Rules always have an exception. A principle has none. Since the Constitution is a principle, let us not tamper with the sound fundamentals it embraces.

Let us have none of the ideas of political theorists who come from other shores, or even from those within our own bourne. We know what is right and enduring. We have had 151 years of experience. Ours is the most mature, and the most secure, government on earth—thanks to our Constitution. We should not seek ideas or help from Europe because we will get none. They are not in a position to give it. The Europe that gave us help a century and a half ago is gone. The other nations of the earth are the "young countries." *Our country* is the *"old country."*

THE MULLEN TESTER

JOHN F. REARDON and JESSIE E. MINOR

▸▸▸ THE MULLEN TESTER is widely used in the paper industry as a basis of strength requirements since it seems, more nearly than any other machine, to combine the various factors of strength such as tension, stretch, direction, etc. It is a common practice in the mills to standardize the type of fibers used, additions to make to the furnish, and other details of manufacture by reference to the effect on the Mullen test. Now it frequently happens that a manufacturer is subjected to the disturbing experience of learning that a buyer's re-check does not verify his original test; also, of recent years, the keener competition and the advent of technical control have enhanced the interest in a clearer interpretation of the meaning of these strength values. The work herein reported was undertaken with a view of finding a logical explanation for the re-check discrepancies. Results reported have not only shown adequate reasons for the lack of accord in values but they have definitely opened up the possibility of using the Mullen value as a convenient, easy method of approximating, in the usual run of fine or coarse papers, the probable rate at which brittleness or discoloration will become apparent.

While individual Mullen tests on one sheet may vary widely, when using at least twenty tests for each average figure given, as was done in this work, it was found that a change of two points or less could be used to fit into the explanations evolved.

Any variation of Mullen re-test values might in general be attributed to one or more of the three following possibilities:

1) Difference between the two instruments used.

2) Difference in atmospheric condition prior to testing.

3) Difference within the paper itself.

Manufacturers and users of Mullen testers have ample opportunity and usually do take care to check instruments for accuracy and, in the general run of many papers tested on one machine, machine variables are comparatively easily detected and remedied. Therefore, in the majority of cases where no machine error can be found one is forced to assume that the difference in checking is more attributable to the paper than to the instrument. The same thing is true in the automobile industry whose records show that more road accidents are due to drivers' eccentricities than to faulty equipment.

In the work which forms the basis of this report, no effort was made to standardize the machine used against other machines but, working on one machine which had been checked in detail by the manufacturer, data has been collected which seems to open up interesting information of practical value to the paper industry.

In the TAPPI book of *Paper Testing Methods* published in 1929 there is a graph which shows that Mullen test values increase with humidity up to 50 per cent relative humidity, then, with further increase of humidity, there is a fall. No reference is made to the type or grade of paper to which this applies. On this graph the entire range from 25 to 50 per cent and from 50 to 65 per cent, or the probable commercial range for paper exposure shows a variation of not over 5 per cent of the Mullen value. Such a variation is entirely inadequate to account for many actual cases of variation for which some further explanation should be sought. Our first work, therefore, was directed towards testing the effect of humidity changes upon the Mullen values using various types of papers.

For this check we chose four representative papers, dehumidified them for four days at 25 per cent relative humidity, tested for Mullen values, then successively conditioned for periods of 18 to 28 hours and tested, using a series of humidity values up to 75 per cent. Results of this work given in Table 1 and Graph 1 indicate that the peak of Mullen value varies with the type of paper and that

Table 1

Changes of Mullen Values With Increasing Humidity

Per cent Change from 65 Per cent Relative Humidity

Per cent R. H.	All-Rag Bond	50% Rag Bond	All Sulphite Bond	Towels
25%	—14.55	—2.65	—5.52	
37	— 7.15	+3.08	+1.83	+2.61
41	— 7.63	+3.48	+2.69	
45	— 5.35	+4.34	+4.01	
50	— 5.40	+3.15	+0.96	+7.71
55	— 2.43	+1.10	+2.23	
60	— 1.43	+0.69	—0.75	
65	none	none	none	
70	— 1.59	—1.19	—0.49	
75	— 3.70	—1.64	—2.07	
80				—3.27

in accurately converting Mullen values from any one humidity to 65 per cent, the type of paper as well as the change of humidity must be considered. For papers of the type of the sulphite bond with gum sizing, the highest value would be at 45 per cent relative humidity, for the towel type of stronger wood fibers less pressed, the peak would be at 50 per cent, while for the glue sized, well pressed, high grade rag fibers, the peak is not reached until 65 per cent humidity. After 65 per cent, all of the papers lost Mullen. This result is consistent with the relative densities of these papers, rag fibers with glue sizing being the slowest to reach saturation while well bleached porous wood fibers are the most accessible.

In 1937, The Institute of Paper Chemistry published a report* of a similar study of the variation of Mullen values with humidity. For their work they used eighteen representative papers which they tested periodically while being continuously humidified at relative humidities which increased from 30 to 85 per cent, then decreased to 40 per cent. For ten of the papers, they found the highest Mullen on the ascending series at 40 per cent humidity and for these increasing the humidity to 75 per cent caused a steady decrease of Mullen. For five of the papers the highest value was at 50 per cent with a steady loss thereafter and for the remaining three samples the highest value was at 65 per cent. As in our work, all samples lost Mullen after passing 65 per cent.

In the work reported by the Institute, at each increment of humidity, weight values as well as physical tests were taken. The weight values showed that for the decreasing series there was actually more moisture present in the paper at each increment of testing than there was in the parallel atmospheric condition of the ascending series. Apparently both sets of tests could not have been made when the paper was in entire equilibrium with the surrounding atmosphere or the high humidity altered the capacity of the paper for holding moisture.

If we interpret these weight value

(*) "Effect of Relative Humidity on Physical Properties. Institute of Paper Chemistry," *Paper Trade Journal* for April 15th, 1937, TAPPI pages 209-212, inc.

changes of the descending series to the corresponding position on the ascending arm of the curve, we find in the average that, when the atmosphere registered 40 per cent on the descending series, the paper moisture was equivalent to an atmospheric content of about 60 per cent; and when the descending series tests were made in an atmosphere of 50 per cent, the paper moisture corresponded to an atmosphere of the ascending series which registered about 63 per cent. This is shown in detail in Table 2.

The above figures indicate that for most of the tests made at decreasing humidity, the actual moisture content was above that required for a maximum Mullen and we would expect a lower Mullen value than for the corresponding atmospheric condition of the ascending series.

If we now interpolate in the same way the Mullen values attained in the returning series at 40 and 50 per cent atmospheric humidities to the position on the ascending series where such values would fall, we find that in the average and in the majority of individual cases, the atmospheric moisture represented by the position of the Mullen test is less than that represented by the position of the weight values. This is shown in Table 2. Since for most of the papers the moisture is in excess of that required for a maximum Mullen value where more moisture means a lower Mullen, this would mean that the Mullen values of the return series are definitely higher than those of the same paper moisture content of the ascending series. The few exceptions to the rule of lower atmospheric moisture indications from Mullen than from weight tests on the return series are among the bond and one book paper. It is quite probable that the peak for maximum Mullen of these papers is nearer 65 per cent and that the interpolated value is on the ascending arm of the curve. This would mean that here also the Mullen is higher on the return series and that those exceptions are more apparent than real.

This lag in the effect of moisture upon the strength tests of paper after the moisture has been absorbed by the paper is properly called *hysteresis*. No doubt it is due to the slow rate of distribution of the moisture upon the interior surfaces of the paper. It is this factor of slow distribution of moisture which allows for papers held in an unchanging humidity condition a continued increase in flexibility and Mullen strength for a relatively long period of time as is shown in Table 3. But in the above data of Table 2 the real *hysteresis* is slight and the large apparent discrepancies at parallel atmospheric moisture contents are mainly due to a lack of equilibrium between the moisture contents of the atmosphere and of the paper before testing.

This strong evidence of lack of equilibrium between atmosphere and paper under the normal trade conditions of testing is of commercial as well as of research value. In the industry, Mullen tests are commonly made without control of humidity and in laboratories humidification of four to twenty-four hours are considered adequate though some papers hang for days in the humidified room awaiting a convenient testing time. For evidence as to the time needed for equilibrium of moisture we chose from our files five representative papers, hung them in an atmosphere of 65 per cent relative humidity and checked them periodically during 100 hours. Data in Table 3 and Graph 2 show that while the sulphite bond was practically at its peak after 24 hours and the rag book after 48 hours, the tub-sized, rag bond continued to increase for 72 hours. The two remaining papers lost Mullen after the first five hours, possibly before that, the rag bond maintaining a constant after 24 hours and the wood index continuing to lose until after 100 hours at 65 per cent it had lost eight points from the value after 5 hours. All five papers lost strength after 72 hours.

The evidence of this table would indicate that the average manufacturer who ships paper with as much mois-

Graph 1—Relation of Mullen Test Values to Humidity

Samples conditioned in series allowing 18 to 24 hrs. at each increment before testing.

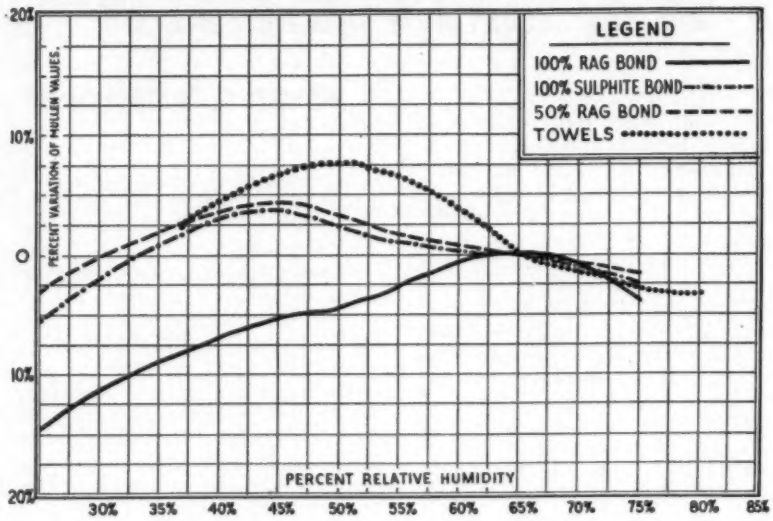

Table 2

Per cent Change of Weight and Mullen Values at 65 Per cent Relative Humidity reported by the Institute of Paper Chemistry as at Decreasing Humidity which have been interpolated to the Corresponding Relative Humidity Position of the Ascending Series.

Paper Number	40% Relative Humidity on the Descending Series is equivalent on the Ascending Series to these Relative Humidities for		50% Relative Humidity on the Descending Series is equivalent on the Ascending Series to these Relative Humidities for	
	Weight	Mullen	Weight	Mullen
1.	59.3	53.6	61.5	60.9
2.	60.3	39.6	61.3	50.0
3.	61.2	53.1	64.0	65.9
4.	57.5	64.5	59.4	65.2
5.	65.7	50.0	66.3	67.1
6.	56.8	64.1	63.6	65.3
7.	58.4	70.6	63.1	65.5
8.	65.4	58.8	66.7	60.4
9.	55.4	62.4	67.4	47.4
10.		63.7	65.0	62.7
11.	57.8	53.7	61.5	55.3
12.	58.4		59.7	
13.	57.7	21.5	62.6	43.2
14.	62.9		66.1	52.0
15.	61.9	41.2	64.0	48.2
16.	61.4	0.0	64.4	
17.	58.6	57.1	62.9	60.7
18.	59.7	56.0	63.5	54.0
Average.....	59.88	50.62	63.50	57.74

Table 3

Mullen Values with Time of Humidification at 65 Per cent Relative Humidity.

Hours Humidified	All-Rag Book	All-Rag Unsized Bond	All-Rag Tub-Sized Bond	All-Wood Gum-Sized Bond	All-Wood Index
5	18.70	34.38	58.15	28.43	158.33
24	19.15	33.73	58.70	29.58	156.25
48	19.53	33.75	59.18	29.38	154.33
72	18.60	33.83	59.85	29.65	153.60
100	18.55	33.75	58.83	29.27	150.50

ture as is acquired when 65 per cent humidity is held for days may expect that the Mullen value will fall somewhat when it is tested by the receiver. Apparently it is important, if a close interpretation of Mullen values is to be made, that the tests should be made only after the paper has been dehumidified at a standard condition then humidified to a very definite humidity and for a very definite period of time.

In the report of the Institute, the average weight value increase found for the eighteen samples, calculated as per cent change from the value at 65 per cent humidity, shows as follows:

40 to 50% humidity	0.17% change from 65% R. H.
50 65	1.55
65 75	1.92
75-85-75	1.61
75 65	—1.69
65 50	—1.71
50 40	—0.54

From this data we infer that in an atmosphere of 50 per cent relative humidity or less, very little of the atmospheric moisture is absorbed, whereas at humidities above 50 per cent, there is a decided absorption. There has been much discussion in the trade as to whether 65 or 50 per cent should be the accepted standard, the paper manufacturers in the main adhering to 65 per cent, while the printers and such large buyers as the Government Printing Office have a strong preference for a 50 per cent standard. For evidence as to the relative stability of humidication of papers in an atmosphere of 50 per cent as contrasted with 65 per cent, we chose five representative papers, kept them at a humidity of 50 per cent, for 126 hours with periodic testing, then raised the humidity to 65 per cent for 48 hours and again dropped it to 50 per cent for periodic testing. Results of this work are given in Table 4.

This data indicates that the book and bond papers reach equilibrium in 5 to 24 hours and maintain values during a period up to 126 hours which vary from the average mostly by less than 0.5 points. For the heavy index paper, about three days was required for equilibrium, but after this it held fairly constant up to 126 hours. The 48 hours at 65 per cent humidity did not seem to seriously affect the Mullen values since within 5 hours after dropping the humidity to 50 per cent, three of the samples had recovered the equilibrium of the ascending series and within 24 hours even the heavy index gave a Mullen approximately that of the ascending series.

This result of such easy attainment of equilibrium at 50 per cent and easy recovery of value after a period of higher humidity is additional evidence besides the needs of printers that 50 per cent is a more logical standard for testing. At 50 per cent humidity there is no appreciable lag in the effect of the moisture, the same value may be expected whether the humidity is reached from a higher or a lower value, and the slight variation of Mullen due to moisture content is well within accepted check tolerance.

However, there are papers which lose Mullen during storage for a longer or shorter period of time indicating that they reach moisture conditions somewhat equivalent to the 65 per cent atmospheric condition of three days or that the loss of Mullen is due to some other cause. The function of small amounts of moisture is to allow greater flexibility and decreasing brittleness through the swelling of fibers and fiber masses. But as the moisture on the interior surface increases beyond that required for swelling and flexing, the bonding of the fibers is weakened in a manner which reaches its maximum when paper is submerged in water. Heavily sized, water repellent papers would be expected to require more humidification than softer, more porous papers. Excess moisture may bring about a weakening of the bonding of fibers, it may cause an irreversible increase in bulk from swelling, or it may initiate chemical changes such as the activation of impurities in such a way as to weaken paper strength.

Table 4

Change of Mullen Values with Time of Humidification at 50 Per cent Relative Humidity

Hours Humidified	All-Rag Unsized Bond	All-Rag Tub-Sized Bond	All-Rag Unsized Book	All-Sulphite Unsized Bond	All-Sulphite Unsized Index
Ascending Series					
5	35.50	59.05	19.86	41.44	193.60
24	35.40	60.15	19.35	43.27	196.0
48	35.07	60.40	19.80	42.92	202.0
72	34.43	59.43	20.03	43.20	205.0
99	34.13	59.70	19.53	43.43	210.0
126	35.10	60.23	19.90	42.60	204.8
Descending Series					
5	34.98	59.80	20.35	42.60	208.2
26	34.20	59.40	19.40	43.29	205.2

Table 5

Increase of Thickness from Excess Moisture

Before Steaming	After Steaming	Increase Thickness	Per cent Increase
2.983	3.132	0.149	4.99
3.458	3.580	0.122	3.53
3.970	3.890	none	none

If the original and re-check Mullen tests are both made after normal humidification to 65 per cent, the chance of the paper having reached a much higher humidity between tests is slight and the re-check Mullen would not be expected to fall because of increase of bulk from moisture. In the report from the Institute, when the moisture content within the paper after high humidification is calculated to the moisture content before such humidification, the majority of the eighteen samples tested showed *no loss* but *an actual increase* of Mullen due to high humidification. We have shown in Table 2 that if a humidity as high as 65 per cent is held for a sufficiently long time, the Mullen values will fall markedly, even at the high humidity. This is probably not a normal trade condition.

However, when original and re-check tests are made without special humidification, as is commonly done in

the trade, if the paper meets excess moisture between testings, there might be a loss of Mullen due to extra, irreversible bulking. For evidence as to whether the bulking of paper from moisture was irreversible. Three samples of comparatively new sulphite bond of the same run of paper were tested for thickness at 40 per cent humidity and the exact position of each test was marked. The papers were then highly humidified by holding over steam and dried. Later thickness measurements were again made on the exact spots as marked and at the same humidity.

From this data it is evident that papers do increase their thickness from moisture by as much as 5 per cent and, since paper strength is so largely developed by wet pressing on the machine, it might be expected that such an increase in bulk would weaken the paper.

To study this point, 6 bond papers were tested for Mullen value in an atmosphere of 30 per cent relative humidity, then held in a closed vessel over water until the papers felt definitely limp from absorbed moisture. After drying for four days and when the atmosphere contained exactly 30 per cent humidity, the papers were again tested for Mullen strength. Results are shown in Table 6.

This data indicates that, while there may be a definite increase in bulk and loss of Mullen due to excess humidification, except in the case of the heavily glue-sized, newly-made rag bond, it is not sufficient to account for the large changes in Mullen value found in many lower grades of paper. Therefore, we look for a possible chemical cause for these cases.

For evidence on the point of chemical degradation, we took from our files index papers of wood and rag content which had been tested 3 to 6 months previously, rehumidified them to 65 per cent humidity and retested them. We then made hot water extracts of these papers for pH measurement and found a very definite parallelism between the loss of Mullen during storage and low pH values.

Data of Table 7 indicates that for an index paper of pH 4.0, the loss during less than six months storage was 14.4 points or more than 8 per cent of the original value, while of the four papers of pH above 4.7, the maximum loss was 3.8 points or 2.88 per cent of the original test value. With such loss at low pH from a relatively short normal file storage, it is not surprising that the index of Table 3 lost 8 points during the 100 hours of humidification at 65 per cent. Since in this work both sets of tests were made after complete but not excessive humidification at 65 per cent humidity, no change of bulking would be expected and the sole apparent cause is the low pH from which we would expect a continuation of degradation during the life of the paper.

It is quite probable that the moisture absorbed by paper from an atmosphere of 65 per cent is sufficient to decidedly activate acid ions while the effect of the very slight moisture of 50 per cent is inappreciable in activity since the similar index paper of Table 4, after 126 hours at 50 per cent humidity and 48 hours at 65 per cent, quickly regained approximately the Mullen value of the previous testing.

As further evidence that papers of low pH suffer a potential loss of strength which is rapidly developed under humidification to 65 per cent, we tested three weights of the same type of sulphite bond and re-tested after three weeks and two months. A comparison of Mullen and pH values is given in Table 8.

Graph 2—Change of Mullen Value with Continuous Humidification at 65 per cent for 100 hrs.

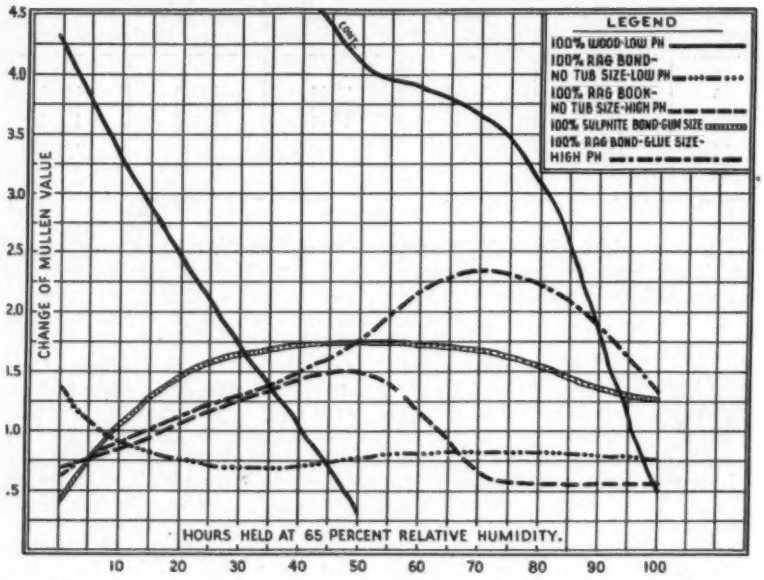

Table 6

Loss of Mullen Burst from Excess Moisture. All Tests made at 30 Per cent Humidity.

No.	Type of Paper	Before Moisture	After Moisture	Per cent Decrease
1.	Sulphite Bond	17.3	16.9	2.10
2.	Worn rag, 100%	31.8	31.6	0.63
3.	Rag content	36.7	36.1	1.63
4.	Rag content	36.0	35.2	2.22
5.	No. 1 Bond, 100% rag, from files	57.9	55.7	3.80
6.	No. 1 Bond, 100% rag, newly made	62.0	55.3	10.81

Table 7

Change of Mullen Values on Storage in Files

Index Papers

No.	pH	Original Test	3-6 mos. Later	Loss Points	Loss Per cent
1.	4.0	170.7	156.3	14.4	8.44
2.	4.2	156.5	144.1	12.4	7.92
3.	4.25	118.9	111.5	6.5	5.47
4.	4.45	105.2	101.3	3.9	3.70
5.	4.65	127.9	115.9	12.0	9.38
6.	4.78	98.8	100.9	none	none
7.	4.80	98.9	96.2	2.7	2.73
8.	5.45	132.1	128.3	3.8	2.88
9.	5.50	140.5	140.6	none	none

Table 8

Change of Mullen Values on Storage

Sulphite Bonds

Paper Folio	pH Value	Per cent Loss 3 weeks	Per cent Loss 2 months
16 lb.	4.35	0.19	0.64
24	4.30	1.98	1.83
20	4.20	2.11	4.68

In this series the loss of Mullen after two months is so parallel to the pH variant as to be almost a straight line function. Also, pH tests on the papers of Graph 2 indicate that those which began to lose Mullen after only five hours of humidification had low pH values while the three which gained for a while before losing had higher pH values.

If the loss from low pH could be detected by some artificial aging which would eliminate the time required for natural aging, then the Mullen test at any humidity could be used to good advantage in studying competitive papers of the same general type. It would only be necessary to age one part of each sheet in some parallel manner, then make sufficient Mullen tests on both parts of each to give an accurate average and calculate the loss due to aging as per cent of original strength. For evidence on this point we oven-aged one set of representative papers for three or six hours at 100 deg. C., aged a parallel set of the same papers in ultraviolet light for two hours, and held a third set for control testing. All three sets were then humidified to 65 per cent humidity overnight and tested for Mullen value. Data of Table 9 again emphasizes the direct relation between Mullen and pH within one type of papers and illustrates how the Mullen test, taken before and after aging, can detect chemical purity of manufacture as well as paper strength.

This close relationship between pH value and Mullen is at once suggestive of a convenient method of detecting indifferent methods of manufacture. It is well accepted that low pH is conducive to discoloration and brittleness with loss of physical strength and that in some papers these changes may occur so quickly as to be detrimental for even a short life span. If a Mullen re-check indicates that the strength is decreasing, a pH test may show definitely that such a change may be expected to continue at an increasing rate and probably could have been avoided by more care in the addition of alum to furnish or in the purity of manufacturing liquids.

In all this work Mullen test is more independent of type of fiber used than is folding endurance or copper number. This is undoubtedly because the test is primarily a pulling apart of fibers rather than a testing of fiber structure and strength which does vary widely with the type of fiber being considered.

SUMMARY

The foregoing evidence indicates that:

1) The Mullen tester may be used as a practical, accurate measure of paper quality when twenty or more individual tests are made for each average value considered.

2) The Mullen values tend to increase with increasing moisture content to a maximum then, with further moisture, they steadily decrease. The moisture content for maximum Mullen varies with the type of paper from 45 per cent for such open textured papers as towels to 65 per cent for the hard tub sized rag bonds.

3) At 65 per cent humidity the Mullen value tends to increase with increasing time of exposure for a period of time which varies from 24 to 72 hours, dependent on the type of paper considered, after which it decreases.

4) At 50 per cent humidity, the moisture absorption for ordinary papers is slight and the effect of time of exposure on the Mullen value is insignificant.

5 The maximum variation of Mullen value with moisture content, within the normal range of 35 to 75 per cent moisture is, for most papers, not over 5 per cent of the value at 65 per cent humidity. Hard glue tub-sized papers

Table 9

Change of Mullen Values on Artificial Aging

Bond Papers

Paper	pH Value	Per cent Loss When Aged in	
		Light	Oven
1.	4.3	16.30	1.83
2.	4.55	11.20	1.54
3.	4.8	4.25	1.73
4.	4.2	16.55	11.50
5.	4.2	15.10	9.50
6.	4.4	15.10	8.13
7.	4.9	13.30	9.00
8.	5.1	6.82	7.91
9.	5.2	5.65	3.34
Waxing Papers			
10.	4.6	17.30	14.80
11.	4.7	19.90	18.10

furnish an exception which is especially marked when the time of exposure is long.

6) Variation of *time* of exposure at a given humidity may make as much difference in strength test results as variation in constancy of humidity condition.

7) Papers of the ordinary lower grades which have been subjected to high moisture then dried may experience an irreversible increase in bulk which is probably less than 5 per cent, and a parallel loss of Mullen which is also probably less than 5 per cent. For newly made, high grade rag bond papers this loss is decidedly greater.

8) Papers which show a decided loss of Mullen on storage usually show low pH values indicating that acidic residues of a faulty manufacturing process are responsible for the loss of Mullen. Since low pH value is commonly associated with the development of brittleness and discoloration, especially when stored under unfavorable conditions, papers which show a marked loss of Mullen on storage or on artificial aging may be considered as more impermanent for their life span than are similar papers which retain their Mullen values reasonably intact.

Loblolly Pine Pulping Qualities

JAMES S. BETHEL
Penn. State College

A research study* showing the effect of age of tree and position of wood in tree on the pulping qualities of this species.

▸▸▸ THE LIGHTNING-LIKE GROWTH of the pulp and paper industry in the South, following the perfection of chemical processes for satisfactorily pulping southern pine wood *(Pinus taeda, Pinus echinata, Pinus palustris, Pinus caribaea,* and *Pinus virginiana)*, has brought sharply into focus the inadequacies of these woods. That these species are capable of remarkably rapid growth in many localities in the South is common knowledge, but the results of this accelerated growth as they are reflected in the structure and properties of the wood are for the most part still unrecognized.

Wood technologists have established definitely the fact that differences in tree growth materially affect the properties of the wood subsequently laid down *(1, 2)*. Logs from different positions in the vertical axis of a tree yield different grades of lumber. Likewise, logs from comparable positions in trees of different ages produce wood of varying quality. The importance of these variations has been accepted in many forms of forest utilization but has been largely ignored in commercial pulpwood production. Chidester et al *(3)* found that "all of the strength properties, including resistance to tear," . . . . showed noticeable improvement in progressing upward in the tree. They also discovered that "yield of pulp per cubic foot of solid wood decreased as the diameter (rate of growth) increased." It is reasonable to assume, therefore, that in growing trees for pulpwood, volume alone is not a sufficient measure of the value of the crop. Certainly the quality and utilization quantity of the wood should also be considered.

In manufacturing paper from wood pulp, it is a recognized fact that, within certain limits, long, thick-walled fibers (The term fiber as used here is synonymous with tracheid, the basic longitudinal element in all coniferous wood.) make stronger paper than do the short, thin-walled elements *(4)*. Since the major portion of southern pine pulp goes into the manufacture of kraft papers, and probably will continue to do so, this is an important factor to consider.

An equally important factor is specific gravity. Woods composed largely of thick-walled fibers have a greater specific gravity than those with thin-walled fibers *(5)* and, consequently, produce a greater quantity of pulp from the same volume of logs. Paul *(2)* showed that slash pine *(Pinus caribaea* Mor.) wood having a specific gravity of .55, produced 31 per cent more pulp by weight than did slash

*From a thesis submitted to the faculty of the Duke University School of Forestry in partial fulfillment of the requirements for the degree of Master of Forestry.

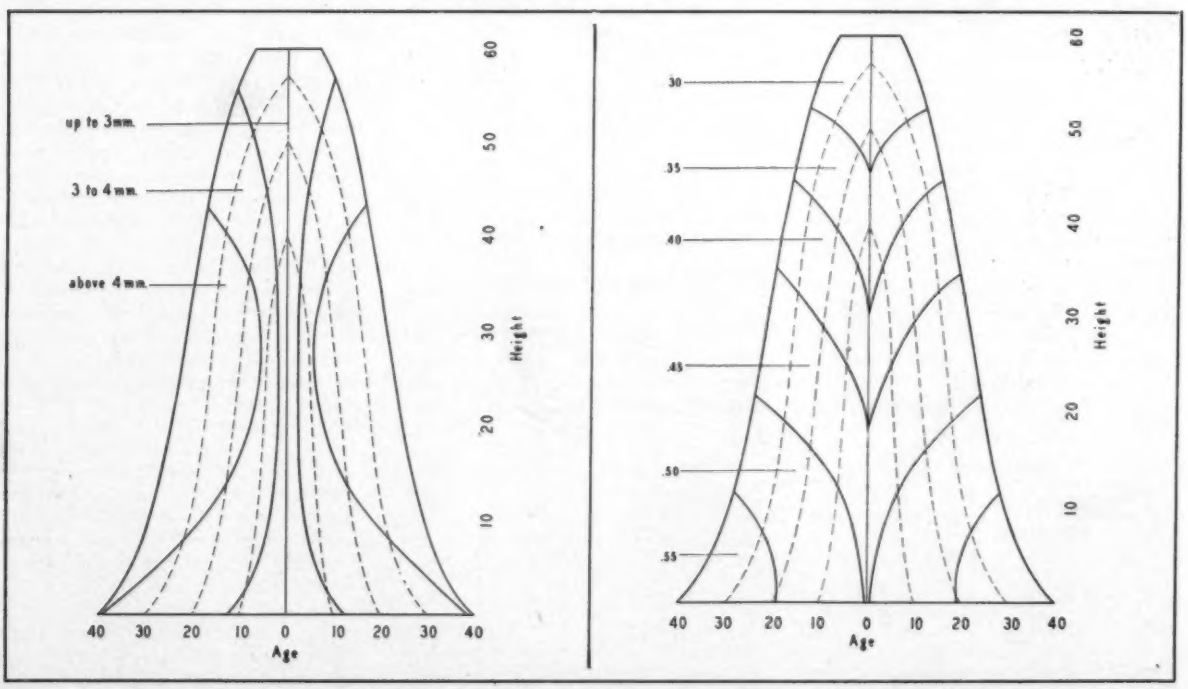

Fig. 1 (left)—Graph showing distribution of fibers by length throughout the longitudinal section of a loblolly pine tree. Fig. 2 (right)—This graph shows variation in specific gravity throughout the longitudinal section of the loblolly pine tree.

EQUATION A

$$\text{Fiber length} = 2.7743 + 2.8526\ (\text{logarithm of the distance from the pith}) + 13.6795\left(\frac{\text{distance up the tree}}{\text{total height}}\right) + (-15.4573)\left(\frac{\text{distance up the tree}}{\text{total height}}\right)^2$$

EQUATION B

$$\text{Specific Gravity} = .5129 + .0442\ (\text{logarithm of the distance from the pith}) + (-.2151)\left(\frac{\text{distance up the tree}}{\text{total height}}\right)$$

pine wood with a specific gravity of .45. In stands of young, fast-growing southern pine it is common to find a much wider range in specific gravity than this. Hence, in determining the pulping qualities of a wood, disregarding the strictly chemical requirements which are not within the scope of this paper, two properties; namely, length and specific gravity, are of paramount importance. The nature of these two properties is a measure of the quality of the paper as well as an expression of the quantity of paper which may be produced from a given volume of wood.

A number of investigations have been carried on from time to time by research workers, both in this country and abroad *(6, 7, 8, 9, 5, 10)*, to ascertain the effect of varying conditions of growth and position within the tree on the length of fiber and specific gravity of the wood produced. The composite results of these experiments have demonstrated that certain basic relationships exist. Therefore, a study was initiated by the author to check statistically some of these relationships for loblolly pine *(Pinus taeda* L.*)* and to attempt to obtain some quantitative data which might be of value in the growing of southern pulpwood.

Six trees were selected for the study. Three were taken from a dry site, where loblolly pine is usually found associated with shortleaf pine and some hardwoods, and the other three were chosen from a wet, lowland site, where the associating species are chiefly hardwoods. In each site, the selecting of one tree of the dominant crown class, another of the co-dominant or intermediate class, and the third of a typically suppressed specimen, gave as good representation as is possible. Samples were taken from every fifth annual ring at four-foot intervals up the tree to a minimum top diameter of three inches. A portion of each sample was pulped by the usual laboratory method of using nitric acid and $KClO_3$ and average fiber measurements were obtained. The remaining part of the sample was utilized to ascertain the specific gravity at the point from which it was removed. A suitable statistical analysis was applied and the data for constructing Figures 1 and 2 were obtained from the accompanying resulting mathematical equations, "A" and "B":

It will be noted that at any particular height in the tree there is an increase in fiber length with an increase in age (Equation "A"). This increase is very rapid in the first few rings and tapers off with greater age until a constant length is approached. A similar relationship appears to hold for specific gravity and age (Equation "B"). Also, the effect of a difference in position along the vertical axis of the tree is much more pronounced for specific gravity than for fiber length (Figures 1 and 2). Apparently a core representing the first ten to fifteen years' growth contains a large percentage of very short fibers. Coupled with this is the fact that this same core contains wood of a much lower specific gravity than that of later years' growth. This would not be a serious factor if pulpwood were produced on a rotation long enough to insure that this core of low-density, short-fibered material did not represent a major portion of the final product. However, if the enthusiasm for producing southern pine pulpwood on rotations of twelve to fifteen years (so prevalent in the past few years) is not tempered in actual practice, the entire production will be in wood of this general character. It seems obvious that trees should be grown not only to a proper pulpwood size but also to a satisfactory pulpwood age.

A method of meeting the problem of variation in wood structure and properties might be the establishment of a series of pulp bolt grades, a suggestion that has appeared from time to time, but never has been thoroughly tried. Chidester et al (loc. cit.) concluded that "segregation of the wood should be advantageous for the production of kraft pulps to attain maximum yield and quality with regard to specific properties." In discussing the possibility of grading pulpwood, Kellogg *(11)* states that, "An essential step in the utilization of material which is not uniform in character is the separation into grades within the limits of which there is sufficient uniformity to permit of like treatment and the establishment of proper values." Such a method of classification would eliminate the inefficient, inaccurate, and expensive practice of buying timber entirely on the basis of wood volume and would add materially to the solution of the pulp chemist's problem of producing a uniform paper product. It is paradoxical in the extreme to produce and market pulpwood on a basis of wood volume, and at the same time to handle pulp and its derivatives strictly on a basis of weight. A series of pulp bolt grades based upon the following three criteria might serve the purpose:

a) Density of wood—expressed in terms of rings per inch and percentage of summerwood.
b) Age—ratio of short fibered core wood to older wood.
c) Defect—knots, decay, and compression wood.

Similar systems of grading for many years have been used with saw timber, shingles, cooperage staves, poles and pilings, railroad ties, etc., to great advantage. Conceivably the same approach might be of value in working with pulpwood.

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A pulpwood crane showing typical wire rope application.

Safer Service From WIRE ROPE

R. B. WILLIAMS

▸▸▸ WIRE ROPE, by its very nature, is a means for the promotion of safety as well as material handling economy. The degree of safety with which wire rope is used depends largely on the way in which it is used. Ropes must be properly chosen for the work to be done. They must be used properly. They must be protected as much as possible from the abuses that can occur all too easily. They must be given careful maintenance attention to preserve their original strength and to keep them in most efficient operating condition.

Generally speaking, ropes that possess a high degree of resistance to abrasion have a comparatively low resistance to bending fatigue. The two qualities vary inversely. This is because high resistance to abrasion is provided by large outer wires of tough material—and because these larger, tougher wires have a relatively low resistance to the metallic fatigue caused by constant bending and rebending.

Lang lay ropes (a construction in which the wires and strands are laid in the same direction) long have been regarded as best suited to resist abrasion.

But before the art of preforming was developed Lang lay ropes had a number of grave faults which prevented their use to advantage in many installations. They were "cranky," inclined to loop and kink, to stretch excessively and to rotate too much. These objectionable features have been removed by preforming, and Lang lay ropes now may be used in many places where they were at one time impractical.

Whenever possible, equipment layouts should favor the rope. Reverse bends should be avoided, if possible. It has been determined in many cases that reverse bending has taken from 40 to 50 per cent from the working lives of wire ropes. Where a reverse bend layout is unavoidable, sheaves should be from one-third to one-half greater in tread diameter than for a layout not involving reverse bends. These sheaves should be spaced as far apart as possible.

Wire rope usually receives its most severe treatment at the point of bends over sheaves and drums. Here the stress effects of the load are vicious, and the life and safety of the rope are greatly affected by the number and position of the bends it is required to make. It is at these points that the stresses develop a crushing action that produces internal pressure far greater than the pressure between the rope and the sheaves.

As a result hemp cores are deformed and the lubricant in the core is squeezed out of the rope. Internal stresses aggravate this situation and add to the metal fatigue. Preforming does much to nullify the fatigue stresses set up at bends by reducing internal resistance and permitting an adjustment of the helical wires and strands to the external load conditions.

After a rope has been selected with due consideration of the work it is to do, many precautions may be taken that will add to the safety with which the rope is worked. During installation, as well as during early use and later use, careful handling will keep the rope in much safer condition.

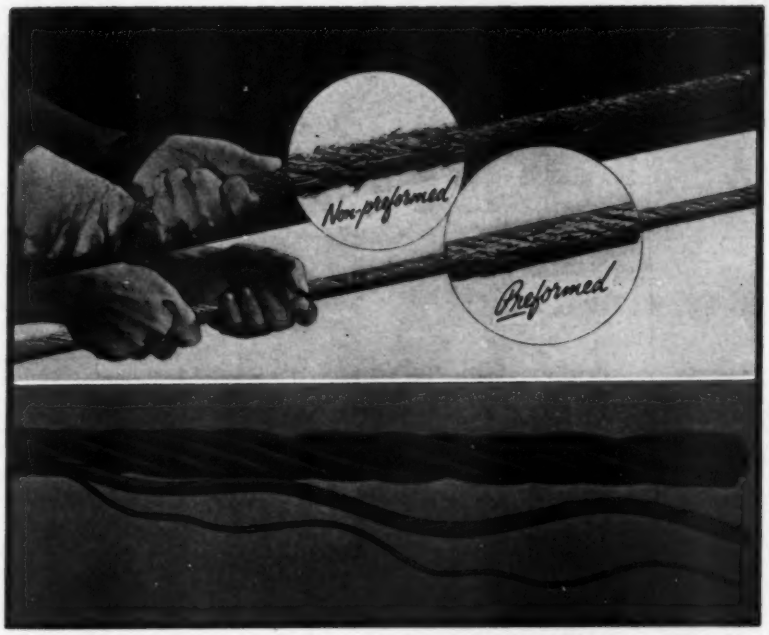
At the time a new rope is being reeved, close attention should be paid to avoiding kinks. Once a rope has been kinked it is unsafe to use. After a short period of use the rope will fail in the kinked section.

When a new rope is being reeved, rope attachments of all kinds should be made in line with standard practice. If clips are used, the correct number should be applied. These clips should be spaced six rope diameters apart. Clip bases should bear on the pulling side of the rope—and U-bolts on the short end. The clips should be tightened when the rope is under tension and retightened after the line has been in operation for a number of hours.

If sockets are used, the wires that fit into the baskets should be carefully mule-tailed and cleaned. Pure zinc is the only metal that should be used for pouring. The other metals, such as babbitt, lead, tin and antimony, that are sometimes used, are not safe. Tests made on socket connections of these unsafe metals show that many of the wires pull out under tension equal to only 25 per cent of the strength of the rope.

The reeving of new rope and the attachment of rope fittings is done more safely when a preformed rope is used. A preformed rope resists kinking. It is easier to thread through sheaves and blocks and the eye of the drum, because its ends are not served with the wire seizings required on all ropes that are not preformed. It is not necessary to apply these protective seizings at points where the rope must be cut.

Socket attachments made with preformed wire rope are ordinarily safer, because preformed rope has no tend-



Above—This illustration shows why preformed rope is safer to handle than non-preformed. Broken crown wires in preformed rope lie flat and in place, refusing to wicker out and become vicious chisel-sharp jaggers to injure workmen's hands. Below—In preformed wire rope each wire and strand is preshaped to the exact helical curve it must assume in the finished rope. Being preformed, the wires are free of the locked up torsional stresses which cause non-preformed rope to be cranky, hard-to-handle and kinky.

ency to unlay at the point where the rope enters the socket. Each strand and wire carries its full share of the load, consequently there is less danger of the breakage of individual wires.

The first safety provision that must be made by a user of wire rope is the selection of a rope that gives him a suitable factor of safety. Obviously, if he has to lift a weight of ten tons he will not select a rope with a breaking strength of ten tons—or eleven or twelve tons. He will want a factor of safety of at least five—which means that he will lift his ten ton load with a rope that is capable of lifting at least fifty tons. In many cases—mine shafts, for example—the factor of safety is prescribed by law. Often this factor will be as high as ten, or even larger—the actual figure being determined by the degree of human risk involved.

In selecting an adequate factor of safety it is necessary to take into consideration the extent of the risk, loads on the rope, line speeds, acceleration and deceleration loads, conditions governing corrosion and abrasion, diameters of drums and sheaves, condition of equipment, and all other influences that may have a bearing on the life of the rope. This selection calls for considerable experience. In many cases a rope that provides a proper factor of safety can be selected only by a specialist who knows wire rope, its possibilities and its limitations.

Naturally, as a rope is used continuously, the original factor of safety decreases. As a rope is worn down in diameter, its metallic end section is reduced. This means there is not as much metal carrying the load. The rope is weaker than it was. The factor of safety is lower.

There are fairly definite rules for determining when ropes in various applications are so reduced in strength that it is advisable to remove them from service. These rules take into account the reduction in diameter, the number of broken rope wires, the stretching characteristics, the amount of corrosion observed and other factors that have a bearing on the safety of the rope in service.

One of the important safety contributions that the preforming of wire ropes has brought about is the longer maintenance of the factor of safety. Of two ropes of equal original strength —one preformed and the other not preformed—the preformed rope holds its strength longer. This strength-life superiority of preformed rope is due to the relieving of internal stresses that reduce resistance to bending fatigue. Constant bending over drums and sheaves does not fatigue a preformed rope as rapidly as a rope that is not preformed.

After all the conditions on a given rope job have been surveyed, there comes the task of deciding what rope construction, what rope size, what rope lay, and what grade of rope metal are to be employed. The man who makes a decision on all of these points must be competent to determine how various ropes are affected by bending fatigue, abrasion, corrosion and other influences affecting the safety with which rope is used. Usually it is best to get the recommendation of the rope manufacturer, who in all probability, has often encountered sets of conditions practically identical with those in question.

After the rope has been installed it should be operated under light load and at reduced speed during the first few days. It should be accelerated and decelerated gradually. This practice is particularly recommended when a non-preformed rope is in use. More care must be taken with such a rope than with a preformed rope, so that all strands will set properly to the core and adjust themselves to carry an equal share of the load.

When a preformed rope is going through the period of early service, it has many of the features of a rope that has been correctly "broken in." Strands bear uniformly on the core. The entire rope body is more compact and substantial. After the first few applications of load have given the rope its constructional stretch it is ready for full duty. New non-preformed ropes should be handled with care until the rope has set itself to its task and is well broken in.

The Use of Dyes in the Beater

W. H. BIRCHARD

▸▸▸ EVEN THOUGH THE LITERATURE contains considerable information on the use of dyestuffs in paper making, insufficient attention is paid to this information when adding color to the beater. More attention is paid to the amount of color or colors added to obtain the required match than to the type of dye used and the method of setting it on the fiber. This unfamiliarity with basic information, often leads to difficulties which are frequently attributed to other causes.

In the textile industry, more work has been done studying the chemical behavior of the various dyes and as a result, more care is taken in dyeing in that industry than in the paper industry. This may be due in part to the fact that more dyeing is done in the textile than in the paper industry, but it is probably due more to the fact that the dyes are mixed in the vat and the material to be dyed is immersed in the vat. Difficulties that are not noticed in beater dyeing have been made more apparent by this method. Curdling of dyes occurs more often than is generally realized, but due to the fact that the dye is added to the beater full of stock, this curdling is not noticed.

In the dyeing of paper, dyestuffs are usually divided into three classes; basic, acid and direct dyes with pigment dyes sometimes added as a fourth class.

The basic dyestuffs appear on the market in the form of salts, such as the hydrochloric, oxalate, or double zinc salts of certain color bases. These are very important for the paper trade because of their great brilliancy and tinctorial power, but their fastness to light is very poor. Basic dyes are sensitive to hard water containing lime or magnesium salts, or any free alkali which tends to precipitate the free color base.

The commonest of these basic dyes are:

Rhodanine	Methylene Blue
Safranine	Methyl Violet
Auramine	Bismark Brown
Malachite Green	Chrysoidine

Acid colors appear on the market in the form of salts of the color acids. Their tinctorial powers are generally lower than that of the basic dyes but due to their even dyeing properties and better fastness to light, they are widely used. They require size and alum to hold them on the fiber. The acid dyes are not sensitive to heat and can be dissolved in water at any temperature up to the boil. Acid colors have a tendency to "burn" on the dryers or show a mottled appearance when run over hot dryers. This is particularly true on heavy papers or board.

The acid dyes consist of the crocein, resorcin, napthol and alizarine dyes, acid blue, metanil yellow and nigrosine.

The substantive or direct colors are salts of color acids which do not require alum to develop their tinctorial power. They dye cellulose directly without the addition of any mordant or fixing agent. These dyes are usually the most fast to light but their brightness and fastness are reduced by the use of alum.

The direct dyes are usually indicated by the word "fast" in the dye name.

It may be added further that nearly all dyes are true colloids and must be treated as such. If an electric current is passed through a solution of a basic dye, it will be noted that the dye migrates to the negative pole indicating a positive charge on the particles. When an electric current is passed through a solution of an acid dye, the dye migrates to the positive pole. This makes it possible to dye one side of a sheet of fabric by passing it through a basic or acid dye bath between two poles in an electric circuit.

The difference between these three types of dyes must be kept in mind when mixing colors because a basic dye will curdle, or the insoluble color lake will be precipitated if mixed with an acid or direct dye. Acid and direct dyes may be mixed in most cases, but care should be exercised at all times.

The mixing of basic and direct or acid dyes in the beater is frequently done with apparently no ill effect if the one dye has been thoroughly mixed with the stock before the second dye is added. However, difficulty is frequently experienced for no apparent reason because the color man does not know or does not realize that he is adding two different types of dye.

The author recalls an instance where difficulty of this nature was brought to his attention. A sheet of canary news was being run in which auramine, a basic dye, and metanil yellow, an acid dye, were being used. Size and alum were being used to set the metanil yellow. Difficulty was experienced due to a pitchy substance collecting on the suction boxes. This built up at such a rate that the boxes had to be pulled and cleaned every hour. A sample was collected and analyzed, and found to be sizing material. In this particular run, a rosin size containing 20 per cent wax was being used. It was apparent that something was precipitating the size before it could be set on the fibers. The dyes were immediately suspected and the auramine and metanil yellow were tried on a size suspension. It was found that auramine was particularly poisonous to both 100 per cent rosin size and 80-20 rosin-wax size while metanil yellow had no effect. Even in the presence of news stock this curdling took place.

The observation led to an examination of other dyes being used with newsprint stock. It was found that all basic dyes tested had a poisoning effect to a greater or less extent on size emulsions. Two types of size emulsions were used: (a) 100 per cent rosin size; (b) 80-20 rosin-wax size.

Safranine was found to cause a slight break with (b) and a more serious break with (a), but was satisfactory in the presence of stock.

Malachite green was found to cause a very serious break with (b) and especially when concentrated, but only a slight break with (a).

Chrysoidine in concentration was poison to both (a) and (b), but in dilute condition is harmless to (a) in the presence of stock.

News blue was found to be poison in both dilute and concentrated form to (a) but satisfactory with (b).

Methyl violet was poison to (b) but was harmless to (a).

Bismark brown is harmless to (b)

and in the dilute with (a) but poison in concentrations.

These observations were made using solutions of the various dyes. When the color was added dry, as it so frequently is in beater coloring, the basic dyes were found in each case to be very poisonous to the size emulsion.

It was found that if the metanil yellow, size and alum were added in that order so that the size and acid color were set on the fibers before the auramine was added, the trouble from the size being curdled could be prevented.

It is also important to note that many dyes are sensitive to *p*H. Frequently failure to match colors in the finished sheet may be attributed to a *p*H variation. If a color match is attempted with the beater furnish before the alum is added, difficulty may be experienced due to a higher *p*H existing in the beater than on the machine. The author recalls an instance where the color of the beater changed from a light green to a brown color with a change in *p*H from 12 to 4.

It would appear that lignin acts as a mordant for basic dyes, probably due to its reactivity with certain types of dyes as demonstrated by the use of aniline sulphate which though forming a colorless solution, produces a bright orange-yellow color with lignin. Ash in the fiber also is an important factor in the setting of dyes on the fiber due to the fact that metallic oxides precipitate insoluble lakes. This mordanting property of lignin accounts for the selective dyeing observed when using such dyes as malachite green and methylene blue with unbleached sulphite. The undercooked fibers containing more lignin absorb more dye and hence are dyed a deeper shade, showing up in the sheet as hairs.

One of the most interesting effects of dyes observed by the author was drawn to his attention by an old-time machine tender who had spent years on a newsprint machine. He maintained that colored news always ran on the machine with less trouble than straight news. He maintained that he had less wet end breaks and the sheet produced was stronger. He was so insistent that such was the case, that strength tests were made on the finished paper, and, surprisingly, colored news averaged 12 to 15 per cent higher in Mullen, 12 to 15 per cent higher in tensile, and as much as 20 per cent higher in tear. With this information at hand, the problem was to find why this should be the case because it was inconceivable that the small amount of dye used could increase the strength so much due to the dye alone.

Realizing that dyes are colloids and that basic dyes are positively charged, it was thought that there might be some relationship between this colloidal property and the increased strength noted, and so the flobility test was used to study the various dyes.

In the flobility test 1 gram of stock is shaken up with one liter of distilled water at 20 deg. C. in a liter measuring cylinder and allowed to stand for 15 minutes. The height of the stock in the cylinder is then read and this figure is taken as the flobility. This test offers a good opportunity to study the sheet-forming properties of a stock. Stocks which have a tendency to clot or slow-forming stocks can be easily detected in this way. Bulky, free stock like sulphite gives a high flobility while slow stock like groundwood gives a low flobility. When flobility tests are run on groundwood or news stock, the supernatant water has a very cloudy appearance due to the fines from the groundwood. The addition of basic dyes to the news stock increased the flobility from 13 to 15 per cent and the water above the stock was left clear.

These tests indicated that the positive electrostatic charge on the basic dyes neutralized the negative charge on the fine cellulose bringing about a coagulation of the fines with the result that when flowing colored stock onto the wire, more fines were retained due to the coagulating effect of the dye. The increased flobility number indicated a slower settling rate and hence a better formation. This better formation plus a better retention of the fines no doubt accounts for the increase in the strength of the finished paper and also for an increase in the wet strength and fewer breaks.

It must be remembered that these tests were made on news stock in an open system. It is reasonable to assume that this increase in strength would not be as noticeable in a closed system due to the fact that no fines are lost in a closed system. However, it is believed that there would be an improvement in sheet formation which would be reflected in improved running conditions.

Another excellent example of the effect of dyestuff on stock was noticed on a board machine when running a colored lined board. While running a pulp board, no difficulty was experienced but color was added to the top liner furnish to produce a colored lined board and immediately the sheet began to "blow." When the color was taken out, the board settled down and ran without difficulty. The explanation arrived at was that the addition of dye retained enough fines to close up the sheet to such an extent that the moisture could not escape at a fast enough rate from the center of the sheet, and, therefore, forced the layers of stock apart.

The above series of tests when repeated with acid dyes, gave negative results. The acid dyes carrying a negative charge, the same as the cellulose, did not coagulate the fines and therefore did not improve the fines retention. However, certain salts were found to have the same effect of increasing the flobility reading as did the basic dyes.

Since such small quantities of basic dyes were capable of producing these increases in strength, it was thought possible to obtain a leuco compound that would have the same effect. A sample of aniline sulphate therefore was obtained and tried. It was found that this compound had the same power of raising the flobility, but unfortunately, it reacts with lignin to form a bright orange-yellow color.

The author has endeavored to record observations on the behavior of dyes in the beater in the hope that it will help solve difficulties that other mills might have along the same line, and also add to the general knowledge on the use of dyes.

250th Anniversary of American Papermaking

WILLIAM BOND WHEELWRIGHT

▸▸▸ AMERICA'S FIRST PAPER MILL was started near Philadelphia in 1690. The industry then founded now produces more than one-half the paper made in the entire world. In 1939, over 13,000,000 tons of paper were manufactured in the United States, yet to supply the demand for newsprint in this country, 2,000,000 tons of Canadian newsprint were imported. The per capita consumption of paper in the United States has grown from less than one pound annually to approximately 246 pounds.

The essential value of paper in civilization cannot be expressed on a "cash and carry" basis. In *The Outline of History*, H. G. Wells points out that it "was the introduction of paper from the East that made practical the long latent method of printing." He dismisses the contention over the invention of printing as "a trivial question which has been preposterously debated," and adds "Far more important is the question of the manufacture of paper. It is scarcely too much to say that paper made the revival of Europe possible."

Nevertheless, the introduction of papermaking in America 250 years ago has been eclipsed from public view by the celebration of the 500th anniversary of the invention of printing from movable type and the observance of the 300th anniversary of printing in the American Colonies.

For his invention of paper in 105 A.D., T'sai Lun was titled a marquis by the Emperor of China; for erecting the first paper mill in England, John Tate was rewarded by Henry VII in 1498; while in 1588, for establishing another mill (Tate's mill having disappeared), John Spillman was knighted by Queen Elizabeth. These historical facts are known quite generally, yet how many could name America's first papermaker? What do we know about this forgotten industrialist?

William Rittenhouse, papermaker by trade, Mennonite minister by profession, Rhenish-Prussian by birth, Dutch citizen by naturalization, emigrated to Pennsylvania in 1688. He settled in Germantown as the first Mennonite minister in the Commonwealth. Two years later he formed a partnership with William Bradford, the progressive first printer of Philadelphia, to manufacture paper.

The little hand mill was erected on Paper Mill Run, a small stream which empties into the Wissahickon River, near Germantown. No trace of the first mill remains, but a dwelling built by Rittenhouse in 1707, stands close to the drive through Fairmont Park. Three generations, at least, of the family resided there. The observant passer-by may see a tablet attached to the house which bears the inscription reproduced on this page. The laconic and incidental last line of this tablet stands alone as a scant reminder of the founder of the American paper industry.

This house was built 1707
Here was born April 8, 1732
DAVID RITTENHOUSE
Astronomer and mathematician
He was Treasurer of the State of Pennsylvania
1777—1795
Director of the United States Mint
1792—1795
President of the American Philosophical Society
Near this site in 1690
WILLIAM RITTENHOUSE
Built the first paper mill in America

Home of William Rittenhouse, located in Fairmount Park, Philadelphia, not far from the site of America's first paper mill.

Perhaps personal sentiment exaggerates the importance of this papermaking anniversary, but the publication of a postage stamp showing the Daye press in official recognition of the beginning of American printing aroused nation-wide interest. However, for fifty-two years after the establishment of this press all colonial printers were dependent upon imported paper.

But there was another good reason for the tardy development of American manufacturers, particularly in New England. This is supplied in A History of Paper Manufacturing in the United States, 1690-1916. "As soon," writes Lyman Horace Weeks, the author, "as there were indications that manufacturing industries were likely to develop in the colonies, the jealousy of the British manufacturers was aroused, for they had always regarded America as altogether an exclusive market for their goods. The British government, acutely responsive to such argument,

and also alive to the political importance of deriving revenue from the colonies, discouraged and in every way endeavored to prevent the establishment of manufacturing enterprises that might be expected adversely to affect the interests of the mother country." In 1732 and 1733, the matter of injurious industrial activity was brought up in the British parliament. The lords' commissioners for trade and plantations reported subsequently that: "In the Massachusetts Bay, an Act passed in the year 1728, intituled, *An Act for the Encouragement of Making Paper*. This Manufacture . . . has hitherto made but small Progress, and can hardly be said, in a strict Sense, to interfere with our own Paper, because almost all the Paper sent to New England is foreign manufacture; but it certainly interferes with the Profit made by our British Merchants upon the foreign Paper sent to this Province." *(1)*

Viewed in this economic perspective, the new enterprise of Rittenhouse takes on a greater significance. The prices for domestic paper evidently had the effect of reducing those charged by British merchants who hitherto had enjoyed a monopoly in the trade. For the building of later mills was encouraged and there were three mills in Pennsylvania and one in New Jersey before the industry was established in Milton, Massachusetts. Thus Rittenhouse not only founded the American paper industry, but emancipated his countrymen from excessive prices and from total dependence upon imported paper.

The American Paper Industry of Today

When papermaking began in America, its primitive mill was a simple affair, operated by Rittenhouse, his son, Claus, who was his assistant, and perhaps a younger son, Gerhard. "A day's work for three men," we are told by Horatio Gates Jones in his *Historical Sketch* of the Rittenhouse Paper Mill, "was four and a half reams of newspaper 20 x 30. So that there might have been made annually at the Rittenhouse mill from 1,200 to 1,500 reams of paper of all kinds."

In those days, "all kinds" meant but three sorts or grades of paper: printing, writing, and wrapping. Paper was sold by the ream, not by the pound as it commonly is today. Hence it is difficult to estimate exactly how many tons were produced in a year. Dard Hunter, the well-known authority on ancient papermaking, weighed actual samples of seventeenth century paper made in America, and reported that a ream of 500 sheets 20 x 27 (.007 in. thick), weighed 94 pounds, and a ream of writing paper 14 x 16 (.004 in. thick) weighed 15½ pounds. From this estimate, it may be assumed that the annual production of the first American paper mill was between 60 tons and 75 tons per year.

Not only has production increased unbelievably, to nearly 13,500,000 tons in 1939, but the full capacity of the United States for 1940 is forecast as 16,420,000 tons.

Figures covering the consumption of paper in the United States are even more impressive. The United States imported 74 per cent of its newsprint requirements last year, mostly from Canada and Newfoundland, but 12 per cent from Europe. The total amount imported was 2,615,000 tons. When this tonnage and other less important importations are added to the domestic production, it is about equivalent to the estimated capacity of the United States paper industry.

It has been said, somewhat euphemistically, that "the consumption of paper is the measure of a people's culture." To assay culture on such a basis would be unduly flattering to the United States. Two hundred and fifty years ago, with a colonial population approximating 200,000, the country consumed annually less than one pound per capita. Today, with a population of about 131,000,000, per capita consumption in the United States is about 246 pounds.

According to a recently published article *(2)*, nine prominent foreign nations showed the following comparatively recent annual per capita consumption of paper:

	Pounds
United States	241
Great Britain	134
Belgium	106
Norway	98
Denmark	96
Germany	94
France	33
Soviet Russia	10
Roumania	8

In 1936, when it was estimated that world production of paper amounted to 23,000,000 tons, United States mills produced 11,975,552. Moreover, at least an additional 2,000,000 tons of imported paper were consumed in the country. Yet the most exuberant American "fan" would hardly claim that the people of the United States are twice as cultured as the people of the rest of the world. This is explained to a great extent by the tremendous variety of uses to which paper is adapted in the United States.

Approximately 40 per cent of the paper consumption in this country is for purposes ordinarily classed as "cultural." These uses include, in the order of tonnage consumed, newsprint, book and magazine paper, and writing paper. More tissues are used than writings, more wrapping than book, more newsprint than the combined tonnage of book and wrapping paper, while container board consumption nearly balances with that of newsprint, book, and writing paper.

This product with such a wide variety of uses, has developed a specialization which makes any one branch of the paper industry as individual as a different industry. The common denominator between the various branches is cellulose. Since the discovery about the middle of the 19th century that cellulose fibers could be isolated from wood, as well as from rags and other plant growths, and paper far cheaper thus manufactured, consumption has progressed almost at a geometrical ratio. Thanks, too, to industrial research and engineering, paper can now compete with many other materials such as steel, glass, rubber, wood, silk, wool, cotton and leather.

But paper *is* being recognized. Three United States universities offer complete courses in paper technology, one of them only on a graduate school level. The first of these courses was established as late as 1913. Another indication of the expansion of the industry is that the number of papers available for printing and writing have multiplied a thousandfold. For example, the lines of paper carried in stock by fifteen representative Chicago paper merchants include a total of 2,081 brands. *The Dictionary of Paper*, published March 1, 1940, by the American Paper and Pulp Association, contains more than 3,500 definitions of pulps, paper-boards, paper properties and paper-making terms. Thus even the English vocabulary has been expanded considerably on account of paper.

According to *United States Pulp and Paper Industry*, published by the United States Department of Commerce, the value of paper products in 1935 approximated a billion and a half dollars. The industry represents an investment in land, buildings, and equipment approximating $1,000,000,000. It gave employment to approximately 267,000 persons to whom it paid in salaries and wages more than $300,000,000.

Surely these accomplishments of two and a half centuries are cause for satisfaction, and reason for holding the founders in grateful memory.

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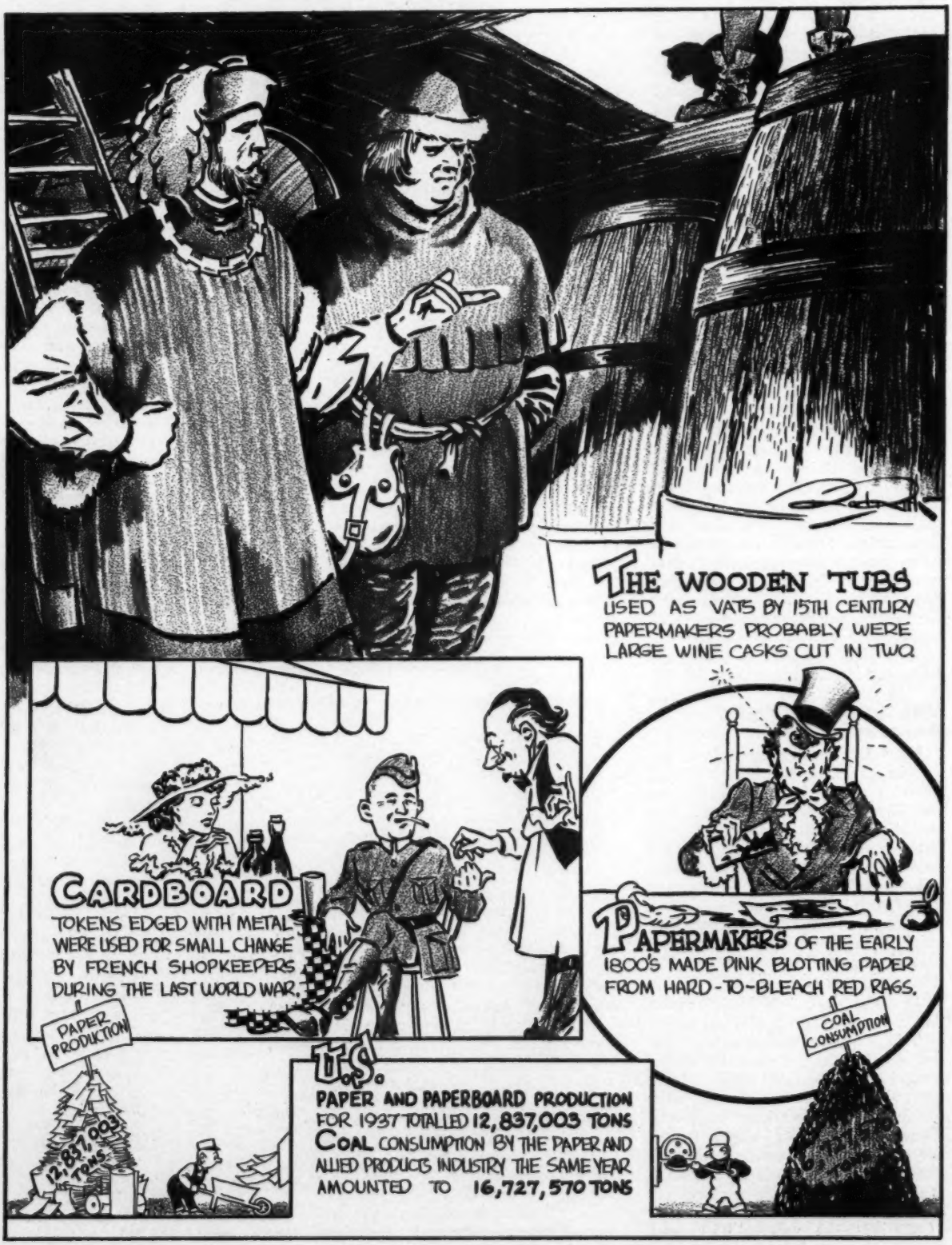
(1) *A History of Paper Manufacturing in the United States, 1690-1916*, by Lyman Horace Weeks.

(2) "Our Amazing Industry," George K. Gibson, THE PAPER INDUSTRY AND PAPER WORLD, (Sept. 1939) 681.

PAPER SKETCHES


THE WOODEN TUBS USED AS VATS BY 15TH CENTURY PAPERMAKERS PROBABLY WERE LARGE WINE CASKS CUT IN TWO.
CARDBOARD TOKENS EDGED WITH METAL WERE USED FOR SMALL CHANGE BY FRENCH SHOPKEEPERS DURING THE LAST WORLD WAR.
PAPERMAKERS OF THE EARLY 1800'S MADE PINK BLOTTING PAPER FROM HARD-TO-BLEACH RED RAGS.
PAPER PRODUCTION
12,837,003 TONS
COAL CONSUMPTION
U.S. PAPER AND PAPERBOARD PRODUCTION FOR 1937 TOTALLED 12,837,003 TONS
COAL CONSUMPTION BY THE PAPER AND ALLIED PRODUCTS INDUSTRY THE SAME YEAR AMOUNTED TO 16,727,570 TONS

The American Pulp and Paper Mill Superintendents Ass'n

MARKS NEW HIGH ON 21ST BIRTHDAY

▸▸▸ TWENTY-ONE YEARS AGO in Appleton, Wisconsin, a group of sincere men formed an organization for the purpose of exchanging ideas and for the development of the paper industry in this country. The foundation was well laid. In the city of Appleton is now located the only educational institution offering a course in paper technology to college graduates exclusively. The cornerstone of the Institute was laid just nine years ago —in June, 1931.

Through the decade just completed, the association then formed has grown in size and importance; and the American Pulp and Paper Mill Association has now "reached its majority." On June 18, 19 and 20, the association celebrated that event with one of the most epochal and colorful gatherings held during its history. Those who chose the meeting place for this twenty-first birthday party could not have pleased the members more. The Netherland Plaza Hotel in Cincinnati, Ohio, had everything even the most fastidious could wish for. This fine hotel is a city within a city, and the air-conditioned meeting rooms left no one any excuse to pass up a meeting because it was too warm.

The city of Cincinnati clings to the title given it some years ago when it was known as the "Queen City of the West," and no one would have questioned its right to wear that crown after hearing the city's mayor, the Honorable James Garfield Stewart, welcome the superintendents and guests at the opening session of the convention Tuesday morning. Some welcome addresses are perfunctory, and a busy mayor usually is excused for disposing of such a duty hurriedly, no matter how sincere or gracious he may be. But Mayor Stewart captivated everyone present as soon as he stepped on the platform, and the warmth and sincerity of his greeting was so bound up in a package of truths and scholarly wrappings that it struck a responsive chord with all of those present. It was he who first sounded what grew to be the real keynote of the convention. He said: "People should cultivate more the spirit of friendship; they should welcome helping one another; they should co-operate. This is the kind of an America we want to preserve." How to make better paper and how to do it economically was, of course, the reason these men had come from mills all over the United States and from Canada. But with this all-absorbing interest mingled the thought of other nations that had met defeat. The mayor closed his address by saying we must carry out the ideals of those who have built up this nation. It is not necessary that everyone think alike on everything, but we must preserve those ideals. "God must reign in America." He left with those present the thought that the defense of this country rests upon the shoulders of men such as they.

The Netherland Plaza Hotel, Cincinnati, Ohio (above), was an ideal meeting place for the association's twenty-first annual meeting. Mayor James Garfield Stewart (shown at left) welcomed the association with an address that stirred his audience.

A. B. C. Drew, the association's first vice president, responded warmly to the mayor's welcome, and with everyone feeling quite at home in the "Queen City," the convention was off to a fine start.

With a registration which totaled about 550, and with eight group meetings on the program, it was nothing short of amazing that President H. H. Harrison could keep up with all of the events. But he seemed always to be in just the right place at the time he was wanted, and with the ever faithful "Bob" Eminger, national secretary-treasurer looking after this and that, and G. W. Craigie, field secretary, tirelessly supervising numerous things to be done, the association's big party was in capable hands.

The President's address to the association is always one of the highlights. President Harrison's address contained so much food for thought that even those who heard it may want to read and study it. The entire text of this address is reproduced herewith.

PRESIDENT HARRISON'S ADDRESS

My Fellow Superintendents:

The forces of hate and violence have again disorganized our lives. The catastrophe which has overtaken Europe threatens us. Some of our members are from the United States, others are from Canada where men are leaving their jobs in the paper mills and going out to face the Unknown. Those left behind are doing their best to carry on. Some of these same men had planned to be here with us today. In these days of rapidly moving destiny, there is but one course open to us all and that is to do our duty whatever and wherever it may be.

If our duty continues to be to run the mills, we have changing conditions to face. We must adapt ourselves to the materials we have. If at times it seems as if we could not maintain standards we have set in the past, we should remember that improvement only comes through struggle and some lasting good may develop out of present difficulties. Necessity often forces us to outdo ourselves. Obstacles are the stepping stones a courageous man uses to build the stairway to success.

If there is a shortage of certain kinds of pulp or dyes or chemicals, the American Pulp and Paper Industry has the resources and ingenuity to cope with the situation. Whatever we can do to maintain the usual habits of living of the people will have a tendency to calm useless hysteria.

One of the effects of the war has been to increase the number of export orders. We have much to learn about conditions in those countries in order to make a good delivery. We should bear in mind that every such order is a diplomatic mission from our country to that foreign land. To send anything but our best just because it is out of the country and cannot be returned does not increase the friendship of the delivery recipient toward the people of the country which made the delivery. Repeat business should be as eagerly sought in export as in domestic markets.

The effect of the war upon some of the economic experiments undertaken during the past few years may be profound. The acid test of reality will etch away what has been bad and will disclose the worthwhile features which should be retained. Thomas Edison once said, "If you want to get results—experiment, and nature talks to you." But when experience proves a thing to have been a mistake we should not embarrass ourselves by trying to maintain an error.

Costs of raw materials are going up. Costs of machine clothing are rising. Taxes for re-armament added to other taxes increase our conversion costs. Increased selling prices will reach a point where volume of demand will decrease. The superintendent must be alert to every possible efficiency which will permit a large volume of goods at a price the public can pay. It is in associations such as ours that he can keep abreast of developments. We need not fear the Anti-Trust Laws, there can be no monopoly of knowledge.

The pooled experience of the industry brings progress at a tremendous rate. I have heard it said that obsolence is occurring today in the Paper Industry almost as fast as in the automobile and radio industries. So far, progress seems to take form of perfecting existing types of equipment and materials rather than radical new developments.

With this 21st convention our association attains its majority. It is appropriate to note a few milestones of its progress.

The first meeting to organize the association was held in the City Hall, Appleton, Wisconsin, June 3 and 4, 1919. Fred C. Boyce who was temporary chairman of that first meeting served until 1922 as president of the association. Peter J. Massey was secretary-treasurer. From the very beginning the plan called for the organization of geographical divisions. One month after the above meeting, the Michigan Division was organized at Kalamazoo and the following month the Northwestern Division was organized. The Miami Valley Division was the third to organize. The following year the Northwestern and the Northern New York Divisions came in. Then at two year intervals the Connecticut Valley, the Southern and the Penn-New Jersey followed. More recently, in 1933, the Pacific Coast organized a division.

In 1928, a grant of $2,500 was made to the University of Maine for use in work of the Pulp and Paper Mill School. In 1931, a donation of $1,000 was made to the Building Fund of the Institute of Paper Chemistry at Appleton.

In April, 1932, the American Pulp and Paper Mill Superintendents Association, a non-profit making enterprise, was incorporated under the laws of the State of Ohio. The purposes for which we incorporated were to discuss matters of mutual interest to our members, without conflicting with established policies of the mills; to assist in the solution of problems confronting the paper industry; to encourage social relations among our members; and to organize various local divisions of the corporation so that its members may derive the benefits of periodical discussion relative to the problems of their section of the country.

Membership in our organization is limited to men who are engaged actively in the manufacture and conversion of pulp, paper products and power plants in connection with mills, also certain others in mills whose duties are of an active and supervisory nature. Even with such restrictions our membership has grown to eight hundred and nine key men of the industry. We are a tax free corporation, yet in spite of that, last year we paid in taxes of one kind or another, an amount equal to sixty cents a member.

It has been both an honor and an education to have served as president of your organization during the past year. The loyal and efficient service of Bob Eminger and George Craigie have made your association function smoothly. No one who has not been intimately concerned with the operation of our organization can realize the specialized knowledge which each of these men possess in their own particular field. The experience of each succeeding year increases their value to the association. I here and now want to express my sincere appreciation for the help I have received from each of them.

Bob Eminger has done such excellent work with the Year Book over such a long period that I am afraid some of us take it for granted. The only way that the association can afford to publish the transactions of the convention bound in one book is by the advertising that is sold in our Year Book. A written record of what was said at the meetings is at times of tremendous value. Those advertisers make it possible for us to preserve the most valuable part of the convention until the times when we need it. There is only one way to really thank an advertiser.

The organization owes a debt to the members of the Finance Committee. In February, I appointed them as Budget Committee so that all of the plans for the raising of funds, the conservation of our resources and the proposed disbursement of funds should be in the hands of one committee. Through the years they have given considerable time and thought to their duties with great benefit to our economic conditions.

I wish to thank the Paper Mill and Wood Pulp News, the official organ of our association for the help and publicity which they have given our organization. To the members of its staff as individuals, I owe thanks for helpful suggestions which were the products of their long experience.

The other trade papers have given us valuable space in their columns and advertising space for which we as an association should thank them.

The Superintendents Association is an affiliate member of The American Paper & Pulp Association. The relations with that organization during the past year have been most cordial. We are going to have the privilege of hearing Mr. E. W. Tinker, the new Executive Secretary of A. P. P. A., at noon, on Thursday. The Salesmen's Association and the Technical Association are also affiliate members. Both organiza-

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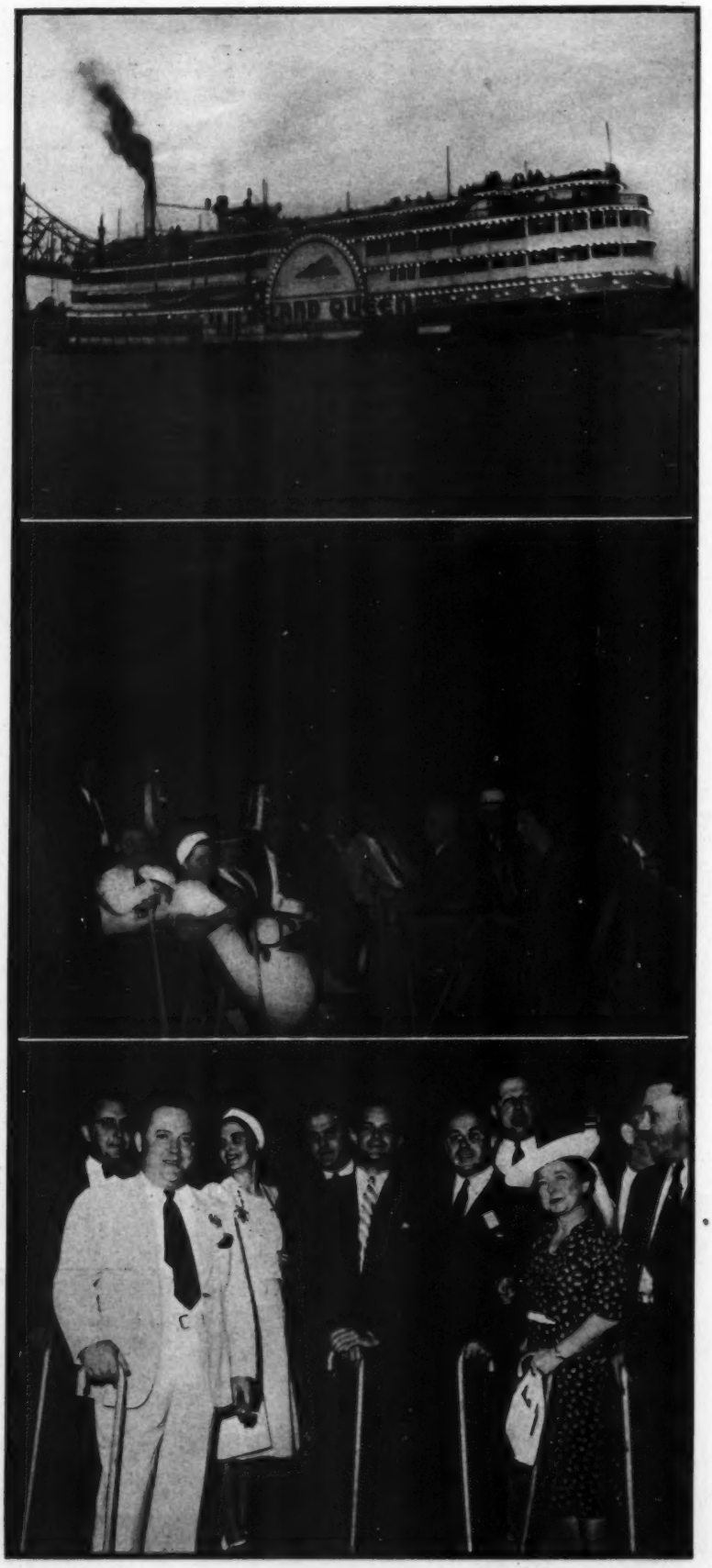
zations have been most gracious and your president has been invited as your representative to attend their convention meetings. We have in turn reciprocated by inviting their presidents to be present here.

Another group whom I must thank are those busy men who have given their time to come here to share their knowledge by delivering addresses or preparing papers. Some of them have gone to great effort to be with us and we should in return give attentive hearing to their messages.

During the past year we have received helpful advice from the National Association of Manufacturers. I believe that more cooperation can be developed between that organization and ourselves and I recommend to my successors to investigate this matter and determine what can be done.

I want to thank the Exhibitors Committee of the Paper Industry for the very real aid which they have given us in making our plans and developing the exhibition. Working with George Craigie, they have been responsible for the success of this activity. There are some who feel that the exhibition carried around to different sections of the country is one of the most educational features of our annual meeting. We are experimenting this year by making a determined effort to get the men in the ranks to come to the Exhibition. In the years to come, these will be the men who will be the Superintendents and run the mills.



That old tune about the "Beautiful Ohio" might have been inspired by someone who took just such a boat trip as the one enjoyed by the superintendents and their guests the first night of the convention. This boat was the Steamer Island Queen (above), and as it pulled out into the river bound for Coney Island, many hurried to the foredeck (center) while some lingered (below) to feel sorry for a few late arrivals who missed the boat.

▶▶▶ The pleasant ride up the "Beautiful Ohio" on the Steamer Island Queen brought a restful relaxation to the busy first day of the convention. The large company transported by bus from the hotel to the boat was in a holiday mood as it boarded the steamer. Canes passed out with the compliments of Draper Brothers Company, Canton, Massachusetts, were put to strenuous use as everyone rushed to the upper decks to get a view of the city before the boat got under way. The trip up the river was impressive. On each side of the river the hills of two states—Ohio and Kentucky—were silhouetted against the sky. The evening was warm and delightful, and by the time the boat reached Coney Island Amusement Park, it was a gay crowd that took possession of the attractions. The orchestra leader entered into the fun and there was plenty of merrymaking. Arrangements for this delightful evening were made by Robert R. Weber, Mathieson Alkali Works.

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Third The life of the felt is increased by this method of loading.

Fourth More uniform moisture is obtained at the dry end.

Fifth Saving in felts when crushes occur, as we are able to unload both sides at once, whereas under the old method using weights the unloading takes time and the felt is usually torn before unloading is completed.

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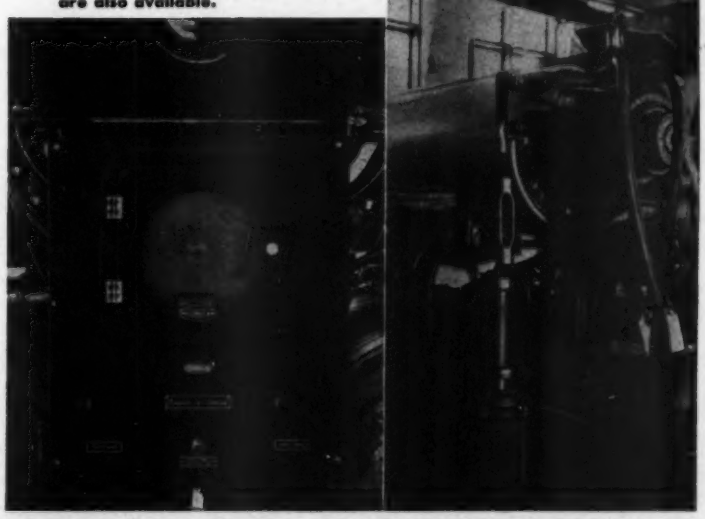

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After the banquet Thursday night, the photographer found this busy group taking a breathing spell. President Harrison and Mrs. Harrison were honored guests of Mr. and Mrs. Lambert Penhallow (at right) host and hostess at the Wisconsin breakfast given each year by Wadhams Div. of Socony-Vacuum Oil Company. Mr. and Mrs. Penhallow were guests at Mrs. Harrison's table for the banquet.

The entire fourth floor of the hotel was given over to association meetings and the exposition. In fact, the exhibit hall was a popular meeting place. Then, too, the beautiful Pavillon Caprice, spacious dining room where the two luncheon meetings were held, was on the same floor, a convenience and an added attraction.

"Money" is the most valuable word in our language, yet most of us know very little about it. For this reason, the address "Know Your Money" given at the Tuesday luncheon made everyone want to check up on the currency in his wallet to see how much he had learned about identifying paper money and coins. F. L. Zellers, past president of the association, was toastmaster at this luncheon. The speaker who gave this valuable talk accompanied by moving pictures was E. B. Huntington, of the U. S. Secret Service. He expressed deep appreciation for the assistance given the Government by many of the paper mills in a campaign to apprehend counterfeiters. It was particularly interesting to learn from Mr. Huntington's talk the difference between the Secret Service and the F. B. I. He cleared up this confusion by stating that while the F. B. I. tracks down criminals, the Secret Service (1) guards the president and his family, and the president-elect; and (2) guards the money, currency, and checks of the Government.

The meetings of the Chemical Pulp, Coated Papers, Fine Papers, Finishing, Storing and Shipping; Newsprint and Wrapping; Plant and Power Engineers were held in the parlors on the fourth floor of the hotel Wednesday morning. President Harrison had arranged an innovation for the Tissue Group by inviting the participants to visit his plant, that of the Crystal Tissue Company at Middletown, Ohio. Transportation had been arranged and after a trip through the mill, an informal discussion led by Walter Johnson, chairman of the group, was held in the mill office. A large number of splendid papers on important subjects were read at these sessions, and abridgments of those that were available will be found in this issue. (See Convention Papers . . . Abridged.)

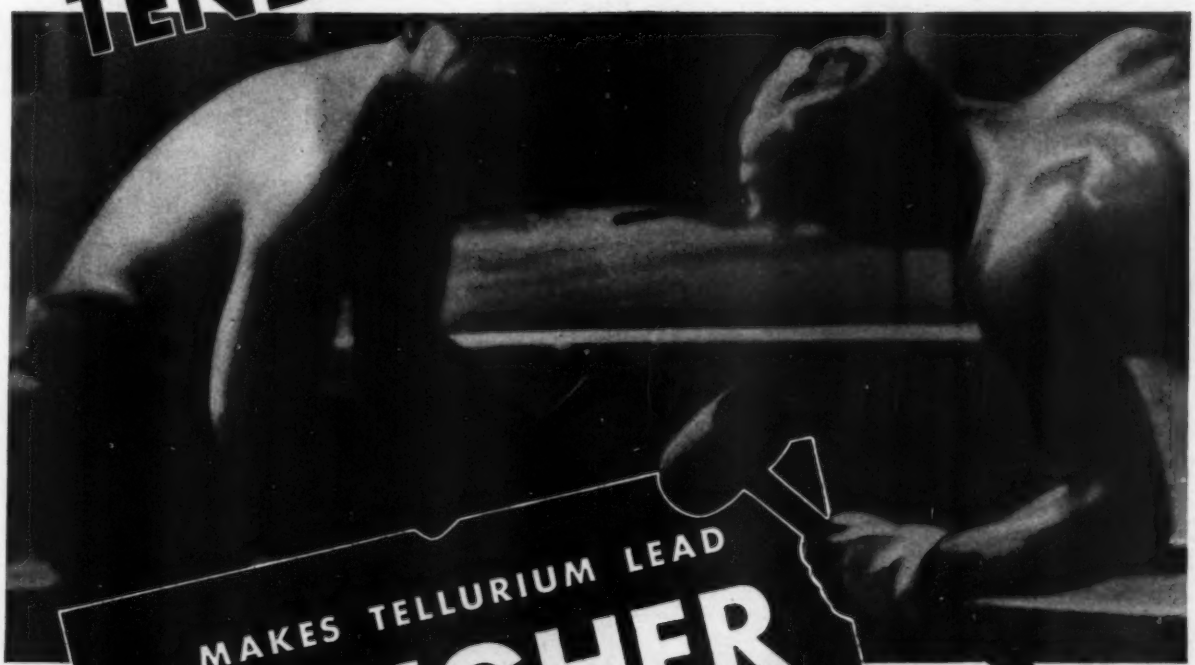
With all of the serious aims and purposes of such a meeting, the superintendents must have some recreation, and Wednesday, the second day, was given over to sports events for those who cared to participate. There was a golf tournament at the Hamilton Country Club, and judging from the late arrivals that hurried into the Pavillon Caprice that night to dinner, the game lasted all afternoon. In charge of the tournament were Marshall L. Barker, Beckett Paper Company, chairman; and Allan Hyer, Black-Clawson Company. The skeet shooting match at the Queen City Gun Club was arranged by Howard Stansell, West Carrollton Parchment Company, G. H. Suhs, Sorg Paper Company, and E. C. Jacobi, Sandy Hill Iron & Brass Works. This popular event drew an enthusiastic number of entrants.

The vast enterprise that is one of the big-timers in this country to help our people "keep clean" was the trip scheduled for both the ladies and the men who did not go in for golf or trap shooting on Wednesday afternoon. Again the big buses loaded with delegates took them to the Procter & Gamble factory at Ivorydale, a busy little town surrounding the plant. The company made extensive arrangements to take care of such a large crowd of visitors, and on leaving the plant each one was presented with a gift box of soap as a souvenir of the occasion.

The haunting melodies of Billy Snyder and his Kentucky Colonels drew the guests to the Pavillon Caprice for the dinner on Wednesday night. The

Participating in the skeet match were: Standing (L to R)—W. M. McGraw, General Electric Co.; E. C. Jacobi, Sandy Hill Iron & Brass Works; Carl Mos. Peters Ammunition (Pro.); Mrs. J. D. Haskell, Dilts Machine Works; Howard Stansall, West Carrollton Parchment Co.; J. Wesley Youngchild, International Paper Co.; Geo. Riedel, Tomahawk Kraft Paper Co.; First row (L to R)—Roscoe H. Smith, Reliance Electric & Engineering Co.; Oscar Stamets, Riegel Paper Co.; J. Wesley Joslyn, Sandy Hill Iron & Brass Works; and J. D. Haskell, Dilts Machine Works.

HAMMERING MAKES STEAK TENDERER...



...MAKES TELLURIUM LEAD TOUGHER

Beat them up—and they're better off. For steak and Tellurium Lead are two of the few things in this world that actually improve under hard knocks.

Hammer Tellurium Lead. Stretch it. Roll it. Bend it. And the result is—increased toughness. This remarkable lead has a unique capacity to strengthen under stress. It work-hardens. Therefore:

1. Turnover points and joints are less subject to cracking.
2. Where vibration is excessive, buckling and creeping are cut down to a minimum.
3. Where heat changes are frequent and rapid, there is less danger of fracture.

Another point to remember! Tellurium Lead dulls the bite of sulphuric and other corrosive acids. This improved acid resistance holds good even at temperatures not far from the metal's melting point.

Tellurium Lead of our manufacture is time-tested St. Joe chemical lead, alloyed with a small quantity of tellurium. It gives the desirable advantages of this well-known chemical lead plus important new ones. Yet the cost is only a fraction of a cent more per pound than chemical lead. In sheets, pipe and coils. For further facts, write to our nearest branch.

NATIONAL LEAD COMPANY

New York, Baltimore, Buffalo, Chicago, Cleveland, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; American Lead Corporation, Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Company, Ltd., Toronto, Montreal, Winnipeg and Vancouver.

TELLURIUM LEAD

dinner was delicious, as were all of the meals served by the hotel; the company pleasant; and the floor show drew a storm of applause. Each of the several acts arranged by local entertainment agents, deserved the ovation given. After watching Texas Tommy put his pony through a long and difficult test, everyone agreed that we should never think of animals as "dumb," and that "horse sense" is an attribute.

Yes, that dinner was a pleasant occasion, and some of those present took away souvenirs to help them remember it. President Harrison introduced Allan Hyer, of Black-Clawson Company, who presented the golf prizes. Announcement was made there was still something more to be given away. The American Rolling Mill Company had displayed in its booth in the exhibit hall a set of Armco stainless steel tableware. Tickets had been given to each visitor stopping at the booth, and this time had been set for the drawing to pick a winner. Fred Boyce, first president of the association, stepped up to the platform and was asked to draw the winning number for this fine prize. The ticket he drew was claimed by David Hayes, of Lawless Brothers Paper Mills, East Rochester, New York.

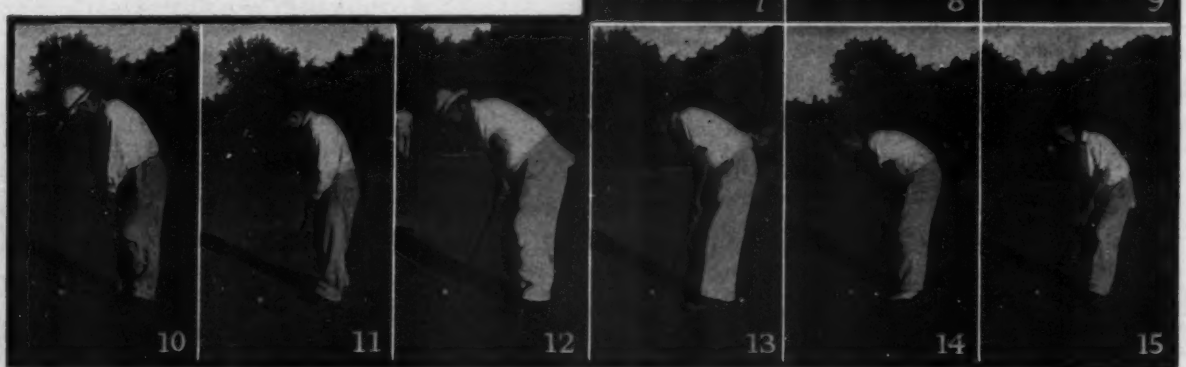
▶▶▶ Thursday, the last day, was a convention within itself. From the All-Wisconsin Breakfast to the last good-nights, the day was packed with fun, serious consideration of vital problems, and pleasant associations.

The Lambert Penhallows, well-known host and hostess of the famous breakfasts given each year by the Wadhams Division of Socony-Vacuum Oil Company, were back this year after having been away from this event last year. As usual, the breakfast, a real meal in true American style, was a good start for the day. President Harrison and Mrs. Harrison were honor guests, and a large number who had received the very imposing invitations, came and exchanged "good mornings" and partook of a bigger breakfast than many of them usually care for.

No meetings had been scheduled for the morning of the last day in order that those who had not had the opportunity might spend some time in the exhibit hall. The exhibitors had a busy time, and if attendance may be considered an evidence of interest, the sales curve will swing upward when the delegates have had time to check their needs.

The Thursday luncheon again filled the Pavillon Caprice to capacity. The guest speaker at this meeting was more than that—he was attending the association meeting for the first time since his official connection with the American Paper and Pulp Association. As William Beckett, toastmaster, intro-

Seen at the tournament were: 1—Kurt Wandel, Marcal Pulp & Paper Co.; 2—E. Peterson, B. F. Goodrich Co.; 3—Clayton de Mers, Taylor Instrument Cos.; 4—Russell Bauman, Johns-Manville Co. (Chicago office); 5—John J. Nylwand, General Dyestuff Corp. (Chicago); 6—Walter Bailey, Dilts Machine Works; 7—Bill Williamson, Shuler & Benninghofen (Portland); 8—U. G. Farmer, Fibreboard Products Co.; 9—Allan Hyer, Black-Clawson Co.; 10—C. T. Bingham, Tyler Wire Works; 11—James M. Fallon, Beveridge Paper Co.; 12—L. A. Thompson, Hercules Powder Co. (Marerro, La.); 13—M. L. Barker, Beckett Paper Co.; 14—John Randolph, Ohio Knife Co.; 15—J. F. Joseph, Cincinnati Rubber Mfg. Co.



There's more to POWELL QUALITY than meets the BUYER'S EYE!

● Beginning a Series of Advertisements to Record Pictorially the Underlying Qualities originating within Our Walls which Make Powell Valves the accepted Standard throughout the Paper Producing Industry.

How frequent it is that you hear a product referred to as *"quality—through and through"!* Yet how seldom is a buyer given specific *evidence* that any more than the *superficial* quality which he can actually *see* in the product justifies such a claim.

In Powell Valves, very definitely, there are *hidden* qualities resulting from constant improvement in materials, design, and workmanship which play a major, but not always fully appreciated, part in assuring an extra margin of service in every paper mill.

In order to make these qualities as readily apparent as any other Powell feature . . . and to put them right at your fingertips for easy future reference . . . we will use the pages of this publication each month to take you into the very departments of our plants where the inherent superiority of Powell Valves originates.

You Need More Than a Photograph of the Finished Product to See ALL the Qualities that Make Powell Valves Uniquely Able to Better Serve the Mill Owner

POWELL VALVES

THE WM. POWELL COMPANY • CINCINNATI, OHIO

At the Thursday luncheon meeting seated at the speakers table (shown below) were important figures in the association. A close-up (at right) shows President Harrison seated between First Vice President Drew and E. W. Tinker (right), guest speaker.

duced E. W. Tinker, executive secretary of the parent association, there was a storm of welcoming applause. Mr. Tinker took up his duties on January 1, succeeding Charles W. Boyce, who resigned. Mr. Tinker was formerly assistant chief forester of the United States Forest Service. As he addressed the gathering, Mr. Tinker stated he wanted to talk not in platitudes, but in realities. He pointed out that we should be prepared for considerable shifting in products and methods. He looked ahead to what might be called another post-war period. He said that the paper industry can meet these changes which may confront it, but it will take cooperation and understanding. The industry has made an enviable record and has established standards that should be preserved.

Following the luncheon, there was a rush for the assembly hall where an important business session, the last of the convention, claimed the attention of delegates for the afternoon. This meeting called for many transactions of the association, including committee reports, election of officers, the adoption of resolutions, and also for the reading of the last papers to be presented.

The Nominating Committee's report was unanimously accepted, giving the association the following slate of new officers for the coming year:

President—A. B. C. Drew, Somerset Pulp & Paper Mill, Somerset, Mass.

First Vice President—Oscar Stamets, Riegel Paper Corp., Riegelsville, N. J.

Second Vice President—Grover Keeth, Marathon Paper Mills Co., Rothschild, Wis.

Third Vice President—L. S. McCurdy, National Paper Products Co., Port Townsend, Wash.

Fourth Vice President—Stanford G. Blankinship, Michigan Paper Company, Marion, Mass.

Fifth Vice President—Ray L. Barton, Michigan Paper Co., Plainwell, Mich.

Secretary-Treasurer—Robert L. Eminger, Miamisburg, Ohio.

Field Secretary—George L. Craigie, Cumberland Mills, Maine.

▶▶▶ The old saying about leaving the best to the last seems to apply sometimes. The banquet on Thursday night, was held in the Hall of Mirrors which formed a perfect setting for such a happy occasion. From the time the line of well-known men was seated at the speakers table, everything moved ahead with precision, under the able direction of Allan Hyer, toastmaster. Billy Snyder and his Kentucky Colonels entertained during the dinner which was a real feast.

As the first part of the after-dinner program, the toastmaster introduced Oscar Stamets, newly-elected first vice president. Then the spotlight was thrown on the ladies as the toastmaster spoke highly of the sympathy and assistance of Mrs. Harrison, wife of the retiring president. He also introduced Mrs. Drew, wife of the president-elect, and presented both ladies with gifts.

The toastmaster then introduced the association's first president, Fred Boyce, who each year presents the retiring president with the Past President's Jewel. Mr. Boyce spoke deeply of the fine leadership the association had received from President Harrison, and

E. W. Tinker, executive secretary of the American Paper and Pulp Association, addressed the Thursday luncheon meeting. William Beckett (seated, right) was toastmaster.

in accepting this token, the retiring president said it would be an honor to wear such a distinctive badge of the office he had held with the association.

"Alphabet" Drew he was humorously called, but he is the association's new president for the coming year and upon being introduced he made a splendid talk. He thanked the association for bestowing upon him the honor of its highest office and assured them very earnestly that he would give the best that he had to the association during the coming year. He said now that the association had grown to the voting age, each superintendent has an individual duty to perform. This means that each and every one is pledged to give his best efforts to the activities of the association.

John Cornell, co-publisher of *The Paper Mill and Wood Pulp News,* was then introduced and he presented to President Harrison the Post trophy, a beautiful Hamilton watch. In accepting the watch, President Harrison said it would always remind him of the "time" he served as president of the association, and as the mechanism performs a perfect function, it would be symbolic of the association work.

And so the introductions went on. Past President Brydges took a bow and spoke of the long list of former presidents. He introduced Past President Timmerman, who led up to a very impressive point in the ceremonies when he introduced A. B. Hanson, executive vice president and general manager of his company, Northern Paper Mills, Green Bay, Wisconsin, and presented Mr. Hansen with an honorary membership in the Superintendents Association.

The toastmaster again took over and

A. B. C. Drew, newly-elected president of the Superintendents Association.

introduced to the association its new fifth vice president, Ray Barton, of the Michigan Paper Company. Next in the line to take a bow was R. G. Macdonald, secretary of the Technical Association of the Pulp and Paper Industry.

Like all of the other arrangements, everything connected with this last meeting had been carefully planned. It was particularly fitting that the speaker of the evening was George H. Mead, president of the Mead Corporation, Chillicothe, Ohio. It was even more fitting that his subject was "Business and Government," for those acquainted with the industry well remember Mr. Mead's association with the N. R. A. in 1933, at which time he was a member of the National Industrial Advisory Board. He predicted that the N. R. A. would be revived, and that business and government would be forced to co-operate. He said we should inform ourselves on all matters pertaining to business and government and exploded the theory that anyone can make money out of a war. He also brought in reminiscences of some of his experiences as a young papermaker which evoked recollections on the part of some of those present. At the close of his address, Mr. Mead was presented with an honorary membership in the association.

As the Hall of Mirrors was cleared for dancing, Billy Snyder and the Colonels tuned up and the superintendents and their ladies enjoyed dancing until everyone present agreed to call it "a day." The orchestra kept up its interest in the program until the last tune, and although played many times during the convention, "God Bless America," caused all to stand at attention and to join earnestly in the song. And so the superintendents started another big year, to meet at Poland Springs, Maine, in 1941.

Viewing the speakers table at the banquet from end to end: Left view (L to R)—Robert L. Eminger, secretary-treasurer; Raymond S. Barton, fifth vice president; R. G. Macdonald, secretary TAPPI; Wm. H. Brydges, past president; Fred Boyce, association's first president. Right view (L to R)—A. B. C. Drew, president-elect; A. B. Hansen, executive vice president and general manager Northern Paper Mills, who was presented with honorary membership; Frank J. Timmerman, past president; Oscar Stamets, first vice president; F. L. Zellers, past president; Chas. Champion, past president; and John Cornell, co-publisher "The Paper Mill." Above is a close-up of President Harrison and George Mead, guest speaker, who were at the center of the table.

CONVENTION MISCELLANY

▶▶▶ A new plan adopted between the allied industries and the Superintendents Association provides for closer co-operation between these two bodies. The allied group will be known as Allied Industrial Affiliates of the American Pulp and Paper Mill Superintendents Association.

▶▶▶ The annual convention of the association makes a fine vacation for the superintendents and their wives, and this year it served as a honeymoon trip for Nate Wardwell, of Carthage Machine Company.

▶▶▶ With the compliments of The New York Color & Chemical Co., Belleville, New Jersey, the morning paper was delivered each day of the convention to all delegates registered at the Netherland Plaza.

▶▶▶ The Superintendents Association may have a theme song if a suggestion made by Allan Hyer, toastmaster at the Thursday night banquet is accepted. He nominated the song "Down by the Old Mill Stream" as the official song of the association, saying he thought it symbolic of an ideal location for paper mills.

▶▶▶ E. E. Grant, president of The Crystal Tissue Company, sent his regrets to the convention. He was unable to attend as a vacation on the Coast kept him away. He was missed at the convention and he, too, missed the satisfaction he would have felt had he been there to witness the efficiency exhibited by President Harrison, of his company, in managing the different sessions of the convention.

▶▶▶ THE NEW YORK MEMBERS of the Salesmen's Association of the Paper Industry held their first outing June 20 at Bethage State Park and eighty-two golfers shared in the distribution of prizes. Non-golfers brought the total attending the dinner which followed, to over one hundred.

▶▶▶ THE BOSTON PAPER TRADE ASSOCIATION held its golf tournament on June 10 at the Charles River Country Club, despite the rainy weather. Gorham Bliss of the Worthy Paper Company took low net prize and Dan Abercrombie of Brightwater Paper Mills, won low gross.

LADIES ENJOYED THEIR VISIT TO THE "QUEEN CITY"

Many of the superintendents' wives look forward to the annual meetings of the association with pleasant anticipation. The ladies always enjoy these meetings because of the elaborate arrangements for their enjoyment while the men are occupied with business.

The ladies who visited Cincinnati this year long will remember that visit. Mrs. Katherine Beall, the hostess, took care of all details and they were taken on sightseeing trips stopping at most of the special attractions of which the city boasts. There were special luncheons for them and they joined the men on the boat ride Tuesday night and the dinner meeting on Wednesday night, also the banquet which closed the convention.

The fine store of Pogue Company and the exclusive shops located within the hotel gave them an opportunity to spend spare moments shopping. They were taken on trips to the Taft Museum and the famed Rookwood pottery. Then, too, a large number of them joined the men in touring the Procter & Gamble plant.

CANADIAN TECHNICAL SECTION

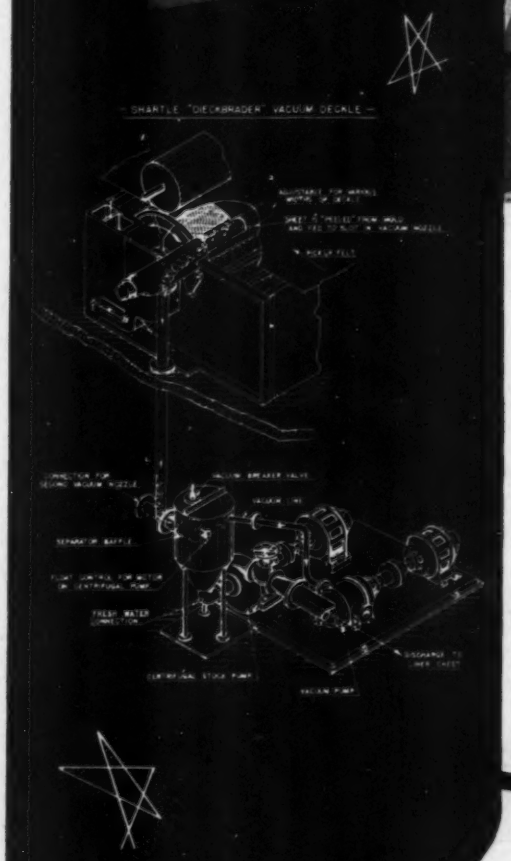
▶▶▶ ALTHOUGH THE WAR has cast its shadow over Canada, it has served, in the opinion of most, to further strengthen the industrial sinews of the Province which is now endeavoring to garner its entire strength for the struggle.

It was with this endeavor in mind that the members of the Canadian Pulp and Paper Association's Technical Section met on June 13, in Grand Mere, Quebec, for its annual summer meeting. Here, on the broad lawns of the famous resort spot, the technical men bent their efforts to aid one another in discussion of problems and questions pertinent to the industry—hampered, perhaps, by the absence of familiar faces—but nevertheless bent on accomplishing their purpose of co-operation.

The meeting was well attended despite the national situation—some hundred persons being present. In place of the usual visits to neighboring pulp and paper mills and the presentation of formal papers, a series of round table discussions had been arranged. Each discussion was handled by one of the standing committees of the Section with the committee chairman presiding. Many tables were set out in the sunshine and the conventioneers acquired a good foundation for a coat of tan. Discussions on all topics were informal and confidential

Left—H. G. Timmis, Consolidated Paper Corp., receives R. A. McInnis trophy from W. D. Mosher, of Consolidated Paper, as Leo Rioux, of Fraser Companies, and Vernon Emory, Technical Section Chairman, look on. Right—Board Committee of Technical Section in action.

NEW SAVINGS FROM LINER TRIM



SHARTLE DIECKBRADER VACUUM DECKLE RETURNS STOCK DIRECTLY TO LINER CHEST

Instead of throwing dollars away by dumping liner trim into your filler chest, save with the Shartle Dieckbrader Vacuum Deckle.

Reports from user mills are so amazing that even we who build this new equipment are surprised. One mill . . . and we quote their own figures . . . reports that the vacuum deckle is saving them no less than **$1000 a month.** And other mills also claim sizeable savings.

Decide today to end liner trim waste. Return this more costly stock to your liner chest instead of mixing it with your less expensive filler stock.

The Shartle Dieckbrader Vacuum Deckle is simple to install and is adjustable for various widths of deckle. It's a "natural", the kind of money-saving equipment you will want in your mill.

Complete details furnished without obligation on your part. Wire, write, or telephone today. **Shartle Brothers, Middletown, Ohio. Division, The Black-Clawson Co., Hamilton, Ohio.**

Shartle Bros.
VACUUM DECKLE

as it was felt that this atmosphere would be most productive of mutual help.

Prior to the meeting each company had been asked to send in questions or problems which it would like to see brought up by the appropriate committees. These problems were sorted by committee chairmen, consolidated and sent out to all committee members and companies as agenda.

The Inn, a popular summer resort, served as headquarters for those attending the convention, although many visitors stayed at Shawinigan Falls either at the Cascades Inn or elsewhere.

Honored guest at the Technical Association dinner was F. G. Robinson, president of the Canadian Pulp and Paper Association and vice president of the Canadian International Paper, Ltd. Mr. Robinson was introduced by the chairman of the Technical Section, Vernon Emery of Fraser Companies, Ltd. The theme of Mr. Robinson's address was "Concentrate-Integrate-Enthuse" and the applause it invoked augured well for the co-operation of executives and technical men which Mr. Robinson urged. Some high lights of Mr. Robinson's address follow:

"You may rest content that throughout the executive areas of industry there is today the same understanding Sir Arthur Currie developed (eventually to the point of enthusiasm) of the patience all must have and none to a greater extent than you technical men, to permit sound development of research in unhurried persistence so that it may unfold in the full flower of perfection . . . the perfection of practical results . . .

"Today there could be no greater spur to our efforts than the realization of the dire and urgent need from the Canadian industry of large quantities of pulp, paper and paper products . . . such, for example, as board . . . for early and continuous shipment to the United Kingdom and France . . .

"Your ingenuity will be called upon to make, as it were, two blades of grass grow where but one grew before . . .

"I wish to put to you some elements I believe you should develop, so that action in the direction we all aim may result. (1) Concentrate. Diffuse programs, spread too thin, inevitably bring results of trifling or no importance; (2) Integrate your activities with those of the Joint Administrative Committee of which your district office is a member and with the officers and executive committee of your Association who are always available to you for consultation and assistance you seek; (3) Enthuse. Let us put positive enthusiasm into all the projects of this reorganized Association rather than negative possible accomplishment by defeatist carping criticism . . ."

The committees and their chairmen were: Board, F. F. Arnold, Hinde and Dauch Paper Company; Education, J. N. Stephenson, *Pulp and Paper Magazine of Canada;* Engineering, W. T. Bennett, Canadian International Paper Company; Fine Papers, W. A. Ketchen, Fraser Companies, Ltd.; Groundwood, G. E. Shipman, Donnaconna Paper Company; Heat and Power, R. J. Chambers, Anglo-Canadian Pulp and Paper Mills, Ltd.; Newsprint, E. Lonnquist, Canadian International Paper Company; Standards, G. E. Larocque, Rolland Paper Company; Sulphite, Carl Jenz, St. Lawrence Paper Mills, Ltd.; Waste, H. S. Hill, Price Brothers and Company, Ltd.; Wood Chemistry, A. C. Hill, Anglo-Canadian Pulp and Paper Mills, Ltd.

Winner of the R. A. McInnis golf trophy was H. G. Timmis of the Consolidated Paper Corporation. The tournament took place on June 15.

CONVENTIONS AND COMING EVENTS

Aug. 20-23—Technical Association of the Pulp and Paper Industry, Fall Meeting, Seattle, Washington.

Sept. 9-13—American Chemical Society, Fall Meeting, Detroit, Michigan.

Sept. 18—National Industrial Advertisers' Association, National Conference of Industrial Advertising and Marketing Executives, Detroit, Michigan.

Sept. 20-21—American Pulp and Paper Mill Superintendents Association, Northeastern and Connecticut Valley Division, Joint Meeting, Poland Springs House, Poland Springs, Maine.

Sept. 27-28—American Pulp and Paper Mill Superintendents Association, New York-Canadian Division, Lake Placid Club, Lake Placid, New York.

Oct. 2-5—Electrochemical Society, Fall Meeting, Ottawa, Canada.

Oct. 4-5—American Pulp and Paper Mill Superintendents Association, Fall Meeting, Pennsylvania-New Jersey-Delaware Division, Yorktown Hotel, York, Pennsylvania.

Oct. 7-11—National Safety Congress and Exposition, Stevens Hotel, Chicago.

Dec. 2-7—Fourteenth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City.

S A F E T Y

▶▶▶ AT THE ANNUAL MEETING of the New Brunswick Accident Prevention Association, held at St. John, N. B., it was reported that pulp and paper and paper container companies are manifesting more interest in safety. At the meeting, G. A. Schryer, of the Bathurst Power and Paper Company, Bathurst, N. B.; D. T. Meany of the International Paper Company, Dalhousie, N. B., and D. A. McAlary of the Fraser Companies, Edmundson, N. B., were named to the executive committee.

The Paper Industry Safety Contest

July 1, 1939 to June 30, 1940

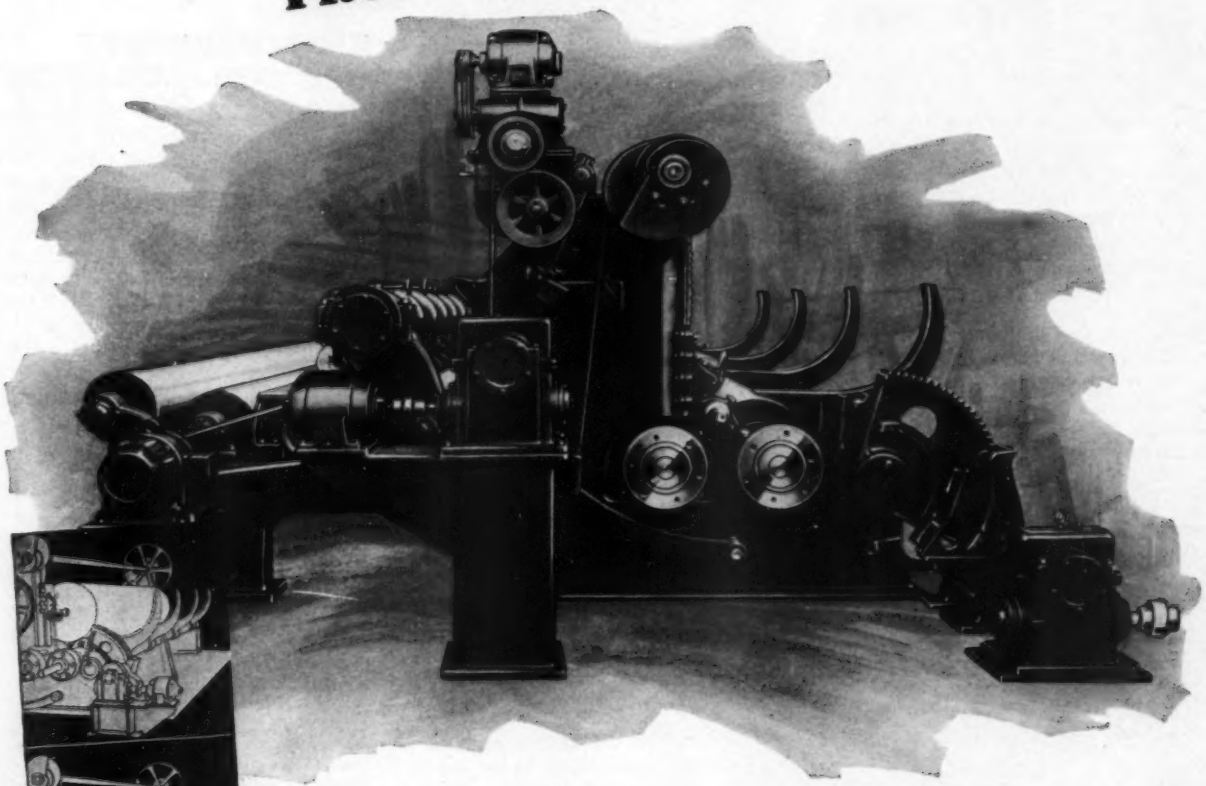
Out of 176 mills reporting for May, 10 have perfect record

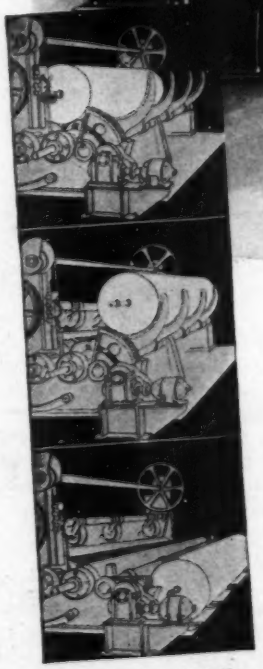
PERFECT SCORES

Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
GROUP B		
GROUP C		
Strathmore Paper Co.	Woronoco	Massachusetts
GROUP D		
The Mead Corporation	Sylva Paperboard Co.	Sylva, N. C.
Spaulding Fibre Co., Inc.	Milton	New Hampshire
United States Gypsum Company	North Kansas City	Missouri
International Paper Co.	Livermore No. 11	Livermore Falls, Me.
The Mead Corporation	Nashville	Tennessee
Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Me.
International Paper Co.	Riley No. 23	Riley, Me.
Spaulding Fibre Co., Inc.	Hayes	New Hampshire
Division II—Paper and Board Re-Manufacturing		
Bay West Paper Co.	Green Bay	Wisconsin

12 Seconds
FROM WINDER TO FLOOR





On completion of winding, roll is moved from over drums to cradle. It is then lowered to truck or floor. All of these operations are fully automatic.

THE BAGLEY & SEWALL WINDER

"A Masterful Accomplishment"

THIS winder is constructed to meet the most advanced developments of papermaking requirements. It is designed to be a real adjunct to the finest paper machines built--and--its actions speak louder than words. A skillful application of all known principles and requirements of correct paper winding is demonstrated by its performance.

The factor of speed has no bearing on the uniform high quality of production. Regardless of speed this winder will produce the finest rolls without rejections and eliminate one traditional source of trouble in the mill.

A bulletin fully describing the many features of the winder will be gladly sent upon request.

THE BAGLEY AND SEWALL COMPANY - - WATERTOWN, NEW YORK

ALLIED

INTERCHEMICAL RELEASES NEW COLOR MOVIE

A new all-color, sound movie, "More Than Meets the Eye," which portrays how chemical coatings are vital considerations in modern industry and how they are important to every day living, has been released recently by the Interchemical Corporation.

The motion picture shows how inks, industrial finishes and enamels, textile colors, etc., act as sales influences and how appearance of an article can often make or break a sale. The picture also describes the process and research back of the manufacture of these coating materials and shows how the requirements of the ultimate consumer must be taken into account in the manufacturing operations. The functions of the various divisions and subsidiaries of International are outlined in the picture.

The film has been prepared so that it will be of interest to manufacturers of products requiring chemical coatings and to the general public which uses these products. It is available for showings to manufacturers, associations, or groups interested in chemical coatings and their importance both in industry and in our daily living.

◆

▶▶▶ A NEW NEUTRAL OIL of low viscosity, trade named "Nopco 1556-X" was announced recently by the Technical Service of the National Oil Products Company. The new oil is especially prepared for the treatment of Bemberg and other synthetic yarns for full fashioned knitting. It is claimed by the laboratory that the oil is highly resistant to oxidation and rancidity and that it may be supplied without any additional preparation.

◆

AMER. CYANAMID LICENSED UNDER BENNETT PATENTS

An exclusive license under all the patents of Bennett, Incorporated, has been granted to the American Cyanamid & Chemical Corporation, it was announced recently. This license is subject only to existing outstanding licenses. The American Cyanamid organization has also acquired that part of the Bennett, Incorporated, business relating to the manufacture and sale of rosin-wax sizes, all wax sizes and liquid rosin size to the paper trade, paper board trade and related industries.

The manufacture of these products will be continued temporarily at Bennett's Lawrence (Massachusetts) plant until provision for the production of them can be made at the new size plant of the American Cyanamid & Chemical Corporation at Kalamazoo, Michigan, and at other conveniently-located size plants. The latter concern has acquired only that part of the Bennett, Incorporated, business related to paper size.

The American Cyanamid's staff of paper size specialists has been augmented by several former members of the Bennett organization including Charles J. Prescott, Jr., Ralph W. Kumler, Harold Sinclair, Florian A. Strovink, Chester C. Irving, Rotheus B. Porter, Jr., and Walter Thomas.

◆

MAGNUS CONDUCTS SALES TRAINING

An extended sales training program is being conducted by the Magnus Chemical Company, Inc., Garwood, New Jersey, manufacturers of industrial cleaning materials and metal-working lubricants.

Members of the sales organization meet in regional groups to participate in an intensive sales study. While based on all phases of selling activities, the subjects of these meetings are directed specifically to the selling of certain leading Magnus products, with some emphasis on the whole line. The entire program is under the supervision of David Blanchard, vice president in charge of sales.

◆

▶▶▶ THE GENERAL OFFICES of the Elastic Stop Nut Corporation have been moved from Elizabeth, New Jersey, to its new plant at 2332 Vauxhall Road, Union, New Jersey, a suburb of Newark. The transfer of manufacturing equipment, which has been in progress for several weeks, has been completed. It was also announced that the corporation's Houston (Texas) office has been moved to the Merchants and Manufacturers Building.

◆

▶▶▶ ALL INDICATING PRESSURE GAUGES and recording gauges previously merchandised under the trade name, "Ashcroft American" are now known simply as "Ashcroft," according to an announcement from the Ashcroft Gauge Division of Manning, Maxwell & Moore, Inc. The name "Ashcroft American" originated with the merging of the American Steam Gauge & Valve Company and the Ashcroft Manufacturing Company, in 1928.

◆

CARRIER HONORS ITS EMPLOYEES

Guests of honor at a dinner commemorating the twenty-fifth anniversary of the Founding of the Carrier Corporation were more than two hundred employees with service records of ten years or more with the air-conditioning firm. The employees were honored as the "men and women behind the scenes who helped to make the anniversary celebration possible." This group, Dr. Willis H. Carrier, founder of the Syracuse (New York) company said, was the "real contributor to the success of the company."

A feature of the dinner was the formation of a Carrier Service Club composed of employees with ten or more years connection with the company. Officers were elected and a social program for the coming year was suggested. Of the 225 present, sixteen were employees who worked with Dr. Carrier in developing the company.

Present at the dinner were, in addition to Dr. Carrier, President J. L. Lyle and Vice Presidents E. T. Murphy and L. Logan Lewis, four of the founders of the Carrier Engineering Corporation, forerunner of the present corporation.

Employees were awarded diamond-studded gold pins with one diamond for each year of service. District office employees whose length of service entitles them to service pins will receive recognition at dinners to be held in New York City, Philadelphia, Chicago and Dallas.

◆

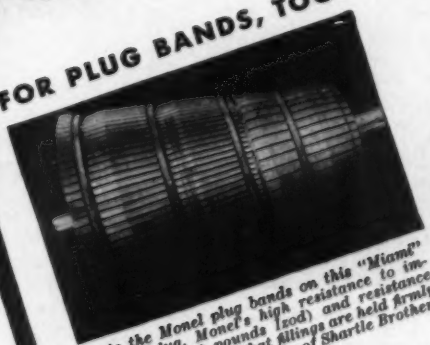
▶▶▶ SKF INDUSTRIES, INC., is carrying through a program of expansion at present, the latest item being the company's No. 2 plant which will materially increase the production of ball and roller bearings. The No. 2 plant, located in Philadelphia, is one of the most modern plants in that city. The one-story, saw-tooth, daylight-type building contains 226,000 square feet of floor space on a plot of 15 acres of beautifully-landscaped lawns. It will be devoted exclusively to the manufacture of anti-friction bearings. Executive sales and sales engineering offices will remain at Plant No. 1.

FOR JORDAN FILLINGS . . .

MONEL POINTS TOWARDS $AVINGS

. . . *when mills obtain from 6 to 14 years of life from Monel fillings refining writing, bond, glassine and tissue stocks*

FOR PLUG BANDS, TOO!



Note the Monel plug bands on this "Miami" jordan plug. Monel's high resistance to impact (120 foot pounds Izod) and resistance to corrosion assure that fillings are held firmly in place. Photo by courtesy of Shartle Brothers Machine Co.

THESE records speak for themselves. And Monel* Jordan fillings in *your* mill will give you much the same performance, because:

1. Monel is stronger and tougher than structural carbon steel.
2. Monel is stubbornly resistant to corrosion from paper stocks.
3. Monel fillings are furnished in minimum Brinell hardnesses of 165, 200, or 250.
4. Monel fillings are *uniform*.

It's this unusual *combination* of properties that gives Monel its long life. Monel fillings do not tend to chip or build up feather edges, but wear evenly and slowly. Write your Jordan manufacturer: he will quote on Monel fillings. Write us for copies of: "*Performance of Monel in Jordan Fillings*" and Bulletin C-3, "*Monel, Nickel and Inconel in Pulp & Paper Mills*".

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET • • • NEW YORK, N. Y.

*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled, and marketed solely by International Nickel.

MONEL

NAMES *in the* NEWS

Personals

APPOINT McCABE TO NATIONAL DEFENSE COMM.

President Thomas B. McCabe of the Scott Paper Company, Chester, Pennsylvania, has accepted the appointment as assistant to Edward R. Stettinius, now in charge of the Division of Raw Materials Co-ordination of the National Defense Advisory Commission.

Thomas B. McCabe

Mr. Stettinius recently resigned as chairman of the board of the United States Steel Corporation in order to serve in his present capacity.

Mr. McCabe has assumed the duties of his new post in Washington and is carrying on this important work in addition to his active duties as president of the Scott Paper Company and chairman of the board of directors of the Federal Reserve Bank of Philadelphia. Mr. McCabe has been associated with the Scott Paper Company since 1916 when he was associated with the company's sales department.

◆

LOHR LEAVES NBC TO HEAD MUSEUM

Lenox R. Lohr has resigned as president of the National Broadcasting Company to accept the presidency of Chicago's Museum of Science and Industry, it was announced recently by Colonel A. A. Sprague, vice president of the museum. Major Lohr, whose fame as the operating executive of the Century of Progress Exposition in 1933 is well known, succeeds the late Rufus C. Dawes as president of the museum.

Major Lohr's resignation from NBC becomes effective on July 12 and it is expected that he will take over his new duties at once. The Museum of Science and Industry, housed in the restored Columbian Exposition Fine Arts Building, is slowly reaching its objective as a center of technical and scientific instruction. Although the museum is not as yet complete, it is expected that under Major Lohr's direction work towards this end will be accomplished rapidly. The museum contains thousands of valuable exhibits of industrial, technical or scientific nature.

◆

▸▸▸ *Harold Crabtree,* president of Howard Smith Paper Mills, Ltd., has been elected president of the Canadian Manufacturers' Association for the next year. The Association held its 69th annuan convention in Winnipeg recently.

◆

A. B. C. DREW WILL MANAGE SOMERSET CO.

At the Superintendents Convention in Cincinnati, it was announced that A. B. C. Drew, the association's newly-elected president will take over the management of the Somerset Pulp & Paper Company, Inc., Somerset, Massachusetts. The company's plans for operating under the new management will soon be announced.

Mr. Drew recently resigned as general superintendent of The Pairpoint Corporation, New Bedford, Massachusetts, which position he had held for a number of years.

◆

ZELLERS NOW WITH CHILLICOTHE PAPER

On the first of July, F. L. Zellers, who has been superintendent of the French Paper Company, Niles, Michigan, became associated with the Chillicothe Paper Company, Chillicothe, Ohio, in the same capacity. Mr. Zellers goes to his new position with a splendid record at French Paper Company, and those who know him are confident of future achievements in his new connection.

During his term of service with the French Paper Company, Mr. Zellers rendered earnest and valuable service both to the national body of the Superintendents Association and to its Michigan Division. At the nineteenth annual meeting of the American Pulp and Paper Mill Superintendents Association, he was elected president. During the year he served as its chief officer, Mr. Zellers was supported by the assistance and loyal co-operation of his company.

F. L. Zellers

Before he left for Ohio, Mr. Zellers' friends and associates of the Michigan Division gave a farewell dinner for him at the Kalamazoo Country Club and presented him with a fine traveling bag as a token of their esteem and good wishes.

◆

FAREWELL BANQUET TO AMBROSE WHITE

Ambrose H. White has said "au revoir" to a long and noteworthy career as a construction engineer.

On June 17, friends and associates met at a testimonial luncheon at the Murray Hill Hotel in New York City, to honor, not only Mr. White himself, but also his enviable record as one of the most active men in his field. Formerly vice president and chief engineer of the International Paper Company, Mr. White supervised the erection of what is now the pulp mill of that company in 1895, later taking charge of the erection of numerous other mills and units of International.

Born at Bucksport, Maine, in 1868,

DE-INKING

Oxford Pulp Process for De-inking of waste paper made from Chemical pulp.

Sterling Process for the De-inking of news.

Continuous cold water processes. Low conversion costs, small loss of fiber with no loss of strength.

Write for particulars

AMERICAN INDUSTRIAL COMPANY

American Industrial Building

631 Niagara Street,

Buffalo, New York

SIMONDS

SLITTERS · KNIVES SAWS

FOR PULP and PAPER MILLS

Write nearest branch for details and prices on highest quality, smooth cutting, tough edge-holding Chipper Knives, Paper Cutter Knives, Circular Saws, Slitters and Cutters.

Simonds Saw and Steel Company

Fitchburg, Mass.

1350 Columbia Rd., Boston, Mass.

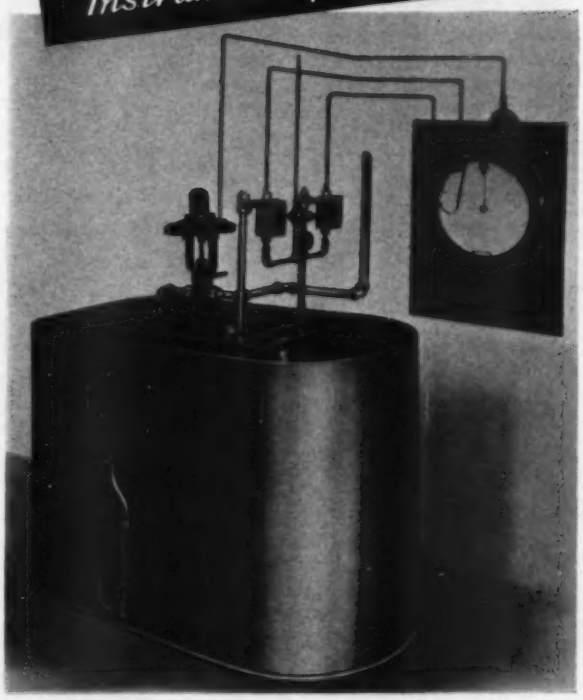
127 So. Green St., Chicago, Ill.

311 S. W. First Ave., Portland, Ore.

228 First St., San Francisco, Calif.

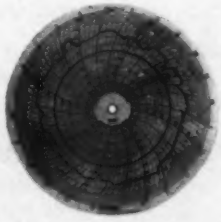
BRAMMER RECORDING CONSISTENCY CONTROL

Instrument by FOXBORO



Licensed under U. S. Patent Numbers: 1,810,111—1,884,075. Other patents pending.

Affords the most accurate and dependable control and recording of consistency regulation of pulps, paper stocks, and viscous liquids. Successfully handles regulation of difficult stocks such as "lumpy" rag and free sulphite. Design is simple and unique . . . with important operating and economy features. Responds instantly to the slightest change in consistency. No moving parts eliminate need of lubrication (except control valve stem), and maintenance. The BRAMMER CONTROL bulletin gives the facts. Write for copy.



Both graphs are registered on the Brammer Recording Chart.

The outer graph represents accurately the consistency of the stock entering the head box from the stuff chest before any diluting water has been added.

The inner graph represents the consistency of the stock leaving the head box after diluting water has been automatically added in proper proportion to secure uniform stock consistency.

PAPER and INDUSTRIAL APPLIANCES

INCORPORATED

122 East 42nd Street **New York, N. Y.**

Mr. White started his business career with a party of engineers surveying the route of what is now the Canadian Pacific Railway across the State of Maine. In 1886 he entered the Maine State College of Agriculture and the Mechanic Arts (now the University of Maine at Orono) as a sophomore. After a series of engineering positions which included a variety of construction work, Mr. White, in 1893, became associated with A. B. Tower of Holyoke, Massachusetts. George F. Hardy, consulting engineer, was then a partner in the firm.

Mr. White became connected with municipal engineering work, later supervising, through Mr. Tower's recommendation, the erection of International's pulp mill at Webster, Maine. In 1896 he supervised the erection of the first paper mill unit at South Brewer, Maine. He joined the International Paper Company in 1898.

Mr. White's career since 1900 has been one of constant progress and it was under his supervision that many of the New England, New York and Canadian paper and power plants of International were built or rebuilt, including the Azizcohos Dam on the Androscoggin River; a pulp mill and machine room at the Otis mill; the hydroelectric plant at Sherman Island on the Hudson River; new dams at Corinth and Glens Falls, New York, and Orono, Maine; additions to the Three Rivers newsprint mill in Canada; building of the Gatineau and Dalhousie mills, and many others.

In 1908 Mr. White was appointed chief engineer of International and in 1927 he was elected a vice president, serving in that capacity until 1931.

At the luncheon, Edward Hutchins, for many years Mr. White's assistant, made the presentation speech in which he praised Mr. White for his long and successful career and for his never-failing spirit of helpfulness to all those who worked with him. Mr. Hutchins concluded his speech by presenting Mr. White with a gold watch, suitably inscribed, together with a bag containing a barrel of "hard money", golf balls and golf tees.

Although Mr. White is severing his active connection with the International Paper Company he is still on call whenever his services as an expert engineer may be required.

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▶▶▶ For forty-eight years foreman of the finishing room of the Pejepscot Paper Company's Bowdoin Mill at Topsham, Maine, *Robert French* retired on June 17. His long and faithful service has been recognized by the company.

MILLIDGE & FAIR NOW IN NEW JOBS

B. D. Millidge, manager of the Howard Smith Paper Mills' Cornwall Division, has been appointed vice president and assistant general manager in charge of production of the Alliance Paper Mills and Don Valley Paper Company, Ltd., both subsidiary companies of Howard Smith Paper Mills, Ltd. A. E. H. Fair, manager of production at Alliance and Don Valley, has been appointed mill manager of the Cornwall Division to succeed Mr. Millidge.

◆

▶▶▶ Associated with the Whiting Corporation, Harvey, Illinois, for twenty years, *Max F. Becker,* formerly sales manager of the company's industrial division, is now vice president in charge of sales representatives. In

Max F. Becker

his new capacity Mr. Becker will be in direct charge of field men in the industrial division. His job will be to direct the activities of Whiting representatives and special agents and to provide them with the sales tools necessary for sales promotion.

◆

BRANDSTROM NOW FORESTER AT C-Z CORP.

The appointment of Axel J. F. Brandstrom as forester for the timber department of the Crown-Zellerbach Corporation was announced June 22 by D. S. Denman, vice president of the company. Mr. Brandstrom was senior economist for the Forest Service at Portland, Oregon, before accepting this appointment.

Mr. Brandstrom's duties will be in connection with the extensive timber holdings of the company in the Pacific Northwest and his headquarters will be in Portland. He is a native of Sweden and a graduate of the University of Washington, having been senior economist for the Forest Service since 1931.

Forester Brandstrom will further the pioneering job C-Z has been doing in forest management toward placing all its timber properties on a sustained yield basis. This program includes harvesting of timber on a rotating crop basis in order to insure a continuing supply of wood pulp. It calls for some tree planting and vigilant fire protection.

◆

▶▶▶ *George F. Mathews,* advertising manager of the Lunkenheimer Company, has been elected president of Cincinnati Industrial Advertisers, it was announced recently. *Ted Brown* of Perry-Brown, Inc., and *Walter Spindler* of the American Rolling Mill Company are vice-presidents while *Herman L. Klein* of the Cincinnati Milling Machine Company was elected secretary-treasurer. Directors for the coming year are *Frank Gerhart* of the Champion Paper and Fibre Company and *Gene Schwarber* of Gardner Publications, Inc.

◆

▶▶▶ *C. P. Robinson,* well known to many in the pulp and paper field, has been appointed special representative of the Kidder Press Company, Inc., Dover, New Hampshire, for the company's slitters and roll winders. Mr. Robinson, a member of TAPPI, has devoted more than twenty years to organizing and developing sales of pulp and paper mill supplies throughout Canada and the United States. Members attending the American Pulp and Paper Mill Superintendents convention in Cincinnati last month, will recall his instructive paper on chipper knives.

◆

GIBBS NOW G.M. AT FERNANDINA

After twenty years' residence in Port Angeles, Washington, as resident manager of pulp and paper mills there, Norman B. Gibbs was transferred recently to Fernandina, Florida, to become general manager of the new Rayonier, Incorporated, pulp mill.

Mr. Gibbs was made resident manager of Washington Pulp and Paper Company at Port Angeles twenty years ago. He was also appointed resident manager of the Olympic Forest Prod-

ucts pulp and lumber mill when it was built in 1929. Two years ago he became production manager of the Rayonier corporation, of which the Olympic organization became a part.

Mr. Gibbs is widely recognized in the industry of the Pacific Northwest as an organizer and executive and is rated highly in the field of labor relations. He has been active in civic and recreational affairs of Port Angeles, serving as Chamber of Commerce president, founding the community's golf club, and working on many other projects.

Necrology

▶▶▶ Associated with the paper industry for more than a half century, *Phineas B. Wheeler,* Holyoke, Massachusetts, has resigned as sales manager of the Franklin Paper Company. Mr. Wheeler started with the old Agawam Paper Company of Mittineague, Massachusetts, 52 years ago and remained with that concern until 1912 to go with the Hawthorne Paper Company, Kalamazoo, Michigan. He became connected with the Franklin company in 1913.

◆

▶▶▶ One of the country's best known papermakers, *Porter Farwell,* passed away June 27 in Turners Falls. He was 92 years of age. Sixty-eight years ago Mr. Farwell started work in the Montague mill of which he served as superintendent. When that company merged with the International Paper Company he continued in that capacity until 1908. Mr. Farwell was also interested in the Ryegate Paper Company, Ryegate, Vermont. During his association with the paper industry, Mr. Farwell's name became synonymous with high grade newsprint, the Montague mill turning out a superior product.

◆

▶▶▶ *William P. Hinkel,* former paper company executive, passed away suddenly June 10, in Chicago. He was 58 years of age and is survived by a son, William, Jr.

◆

▶▶▶ *Arthur E. Cabble,* sales manager of Wm. Cabble Excelsior Wire Manufacturing Company, passed away June 13 at the age of 54. Mr. Cabble retired as president of the company eight years ago because of ill health but later returned to active business life in the capacity of sales manager.

● Think of the above as a common occurrence, duplicated in plant after plant throughout the country. Then you'll know why we say: If you're interested in making *YOUR* machines produce more chips at lower cost, try Atkins Knives. Find out how they increase daily output all along the line . . . by holding a keener edge for longer chipping periods . . . by reducing down-time due to knife breakage . . . by turning out consistently high-quality chips that mean fewer pulp rejects.

Find out, in a word, how Atkins Chipper Knives can help you cut maintenance costs, keep production steady and earn an extra profit on the chipping operation! Write today for full details.

E. C. ATKINS AND COMPANY

453 South Illinois Street, Indianapolis, Indiana

FROM TREE TO PAPER THERE'S HELP AT EVERY STEP FROM ATKINS

Surface Active Chemicals: Their Behavior and Practical Application

J. H. SHIPP, Technical Laboratory
E. I. du Pont de Nemours & Company, Inc.

A simple way of demonstrating surface tension is to place a complete loop of thread upon the surface of water in a basin. The loop will take an irregular shape according to the way it is placed on the water. (Figure 1)

The surface tension inside the loop is the same as that outside the loop, and there is no tendency for the shape to change materially. If we allow a drop of a wetting agent to fall inside the loop, an impressive change occurs. (Figure 2) The loop of thread instantly assumes the form of a circle. The change occurs because the surface tension inside the loop is greatly diminished by the wetting agent, while the surface tension outside the loop remains high. The thread serves as a dam momentarily to keep the wetting agent largely inside the loop. The surface tension of water at room temperature is about 70 dynes per centimeter. This will be the tension pulling outward on each centimeter of the loop of thread. After the wetting agent is added to the inside of the loop, the surface tension may be around 30 dynes per centimeter, which may be represented as pulling inward. The difference of 40 dynes will be the effective or resultant force acting in an outward direction. This force is opposed by the tension in the thread which causes it to take the circular shape.

Figure 1

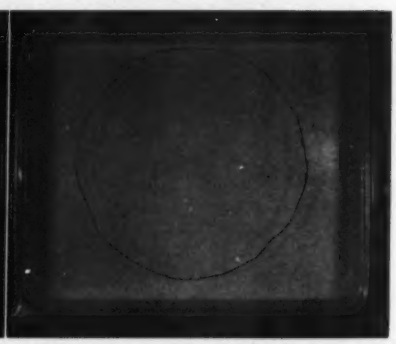


Figure 2

Now as commonly used, the term surface tension of a liquid refers to the surface in contact with air. This is the least important surface when we consider the application of surface active chemicals. We are more likely to be interested in a surface in contact with a solid or another liquid. The tension in that surface of a liquid which is in contact with a solid or another liquid is referred to as the interfacial tension.

Water, with a surface tension much higher than most other liquids, is a poor wetting or penetrating agent.

You can appreciate the possibilities for time saving and quality improvement by the use of wetting agents in industry. Among the uses for wetting agents in the paper industry are the following:

1) Wetting out new felts where the use of a wetting agent greatly diminishes the time required. Some felts are supplied with wetting agent incorporated in them so that they will wet out uniformly and quickly.

2) In disintegrating and slushing dry and hard pulp such as ground wood, kraft, and unbleached sulphite.

3) As rewetting agents for increasing the rate of absorbency of absorbent papers, especially blotting papers, tissues and towels.

4) To increase the wetting speed and improve the dispersion of dry colors, pigments and fillers.

5) In pulping.

6) Treating raw stock which is going into paper to be coated.

7) Dampening greaseproof for glassine.

8) For incorporation in adhesives to increase the wetting speed.

9) In the calender application of color where the use of a wetting agent gives a more uniform distribution of color.

Wetting agents, detergents, penetrants and other surface active products all have one thing in common from the standpoint of chemical structure. They all possess one or more long hydrocarbon chains, which tend to resist solution in water, to the end of which is attached a water solubilizing group. Thus soap, which is one of the oldest surface active chemicals known, may be represented as in formula No. 1 in the following table:

1. CH_3CH_2.....$CH_2COO^-Na^+$
2. CH_3CH_2.....$CH_2SO_4^-Na^+$
3. CH_3CH_2.....$CH_2SO_3^-Na^+$
4. CH_3CH_2.....$CH_2NR_3^+Br^-$

The dotted lines simply mean that the length of the hydrocarbon chain may vary. The COONa group, called the carboxyl group, is responsible for the water solubility of soap. The greatest chemical difference between soap and the more modern surface active agents is in the nature of this terminal group. The "Duponol" products are represented by the second formula wherein the carboxyl group of soap is replaced by the sulphate group. These products are made from long chain alcohols by sulphation and are, therefore, often referred to as the alcohol sulphates. This apparently simple difference in chemical structure between soap and "Duponol" accounts for a tremendous difference in physical and chemical properties. Thus soap is precipitated by hard water because the calcium and magnesium salts of soap are insoluble, whereas, the calcium and magnesium salts of "Duponol" are not only soluble in water but are themselves excellent deterrents.

Soap is readily precipitated by acids, whereas, the alcohol sulphates are soluble in acid solution and retain their wetting and scouring properties in acid solution. They are slowly decomposed by hot acid solutions.

The third formula applies to products known as alkyl sulphonates. They are similar in properties to the alcohol sulphates but are resistant to hot acid solutions.

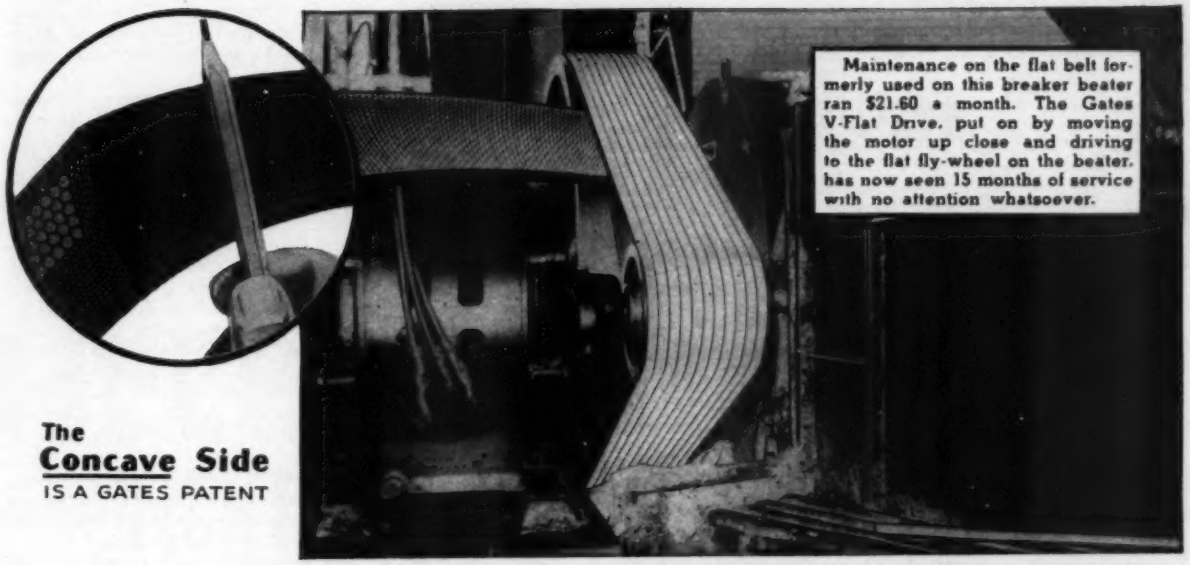
You will note that in the first three formulas the long chain portion of the molecule is represented as carrying negative electrical charges, while the sodium ion carries a positive charge. If we now examine formula No. 4 we shall note that the long chain portion is positively charged and the bromide ion is negatively charged. The first group includes surface active agents which are said to be anionic, whereas, formula No. 4 represents what is known as a cationic type.

Knowing the wetting property of a material in pure water in room temperature is usually not sufficient to choose a product for a given use. The compatibility of the agent with the other constituents of the bath, the temperature of operation, the hardness and *p*H of the water, and other factors have to be taken into consideration.

The presence of salts, such as sodium chloride or sodium sulphate in a system to which a wetting agent is added, sometimes presents a problem. Salt usually has a favorable effect on the wetting efficiency of the agent, provided the agent is soluble in the salt solution. However, many agents are salted out of solution by high concentration of salt. If the proper wetting agent is chosen, no difficulties will be encountered, as there are agents which are quite soluble in saturated brine solutions.

With some wetting agents the *p*H of the

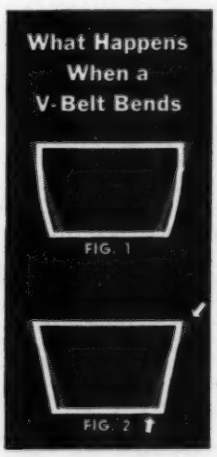
Most of the papers presented at the annual meeting of the Superintendents Association held in Cincinnati, Ohio, June 18, 19 and 20, 1940, have been abridged and are presented in this and succeeding issues.



The **Concave Side** IS A GATES PATENT

Maintenance on the flat belt formerly used on this breaker beater ran $21.60 a month. The Gates V-Flat Drive, put on by moving the motor up close and driving to the flat fly-wheel on the beater, has now seen 15 months of service with no attention whatsoever.

Learn of a SUBSTANTIAL SAVING in BELTS and POWER by making This Simple Test

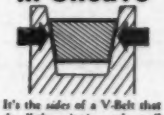


Grip with your fingers the sides of any V-Belt; then bend the belt and feel the sidewall change shape. Being under tension, the top of the belt narrows. The bottom, compressed, becomes wider. The sidewalls bulge. These stresses distort a straight-sided V-belt into a shape that does not fit the sheave groove—as shown in Figure 1 (on the left). Note the out-bulge of the sides.

Now bend a V-belt built with the patented concave side. You'll feel the same stresses, the same shape change with this big difference: the altered shape exactly fits the sheave groove—as shown in figure 2. Two advantages result. (1) No sidewall bulge; therefore uniform sidewall wear; longer life! (2) Full sidewall grip on the pulley; therefore less slippage on heavy loads or sudden load increases—a saving in belt wear and also in POWER.

The Gates Vulco Rope is the only V-Belt built with the patented concave side.

V-Belt in Sheave



It's the sides of a V-Belt that do all the gripping and get all the wear. That's why longer life for the sides means longer life for the belt.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 2240 E. Wash. Blvd.

DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 333 N. W. 5th Ave. SAN FRANCISCO, CAL., 2700 16th St.

Reclosing
and
Recutting

WHEN your SCREEN PLATES become worn, this is the place to send them for Reclosing and Recutting. We have developed this work to a fine art on all types of

FLAT PLATES
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Fitchburg Screen Plate Co., INC.
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bath is very important; with others it makes very little difference within limits.

If colloidal materials are present in a solution to which a wetting agent is to be added, the effect of the wetting agent on these colloidal materials must be considered. Wetting agents precipitate colloids very effectively. Whether or not a given colloid system will be precipitated by a given wetting agent depends upon a number of factors, but by far the most important are the electrical charge on the colloid and the electrical charge on the surface active or long chain portion of the wetting agent. If these electrical charges are of opposite sign, one positive, the other negative, precipitation is highly probable.

Conversely, negatively charged colloids are usually compatible with anionic wetting agents such as the alcohol sulphates, but incompatible with the cation active types. As a rule the cationic wetting agents are compatible with basic dyestuffs, the anionic with the acid dyestuffs, although some wetting agents can be used with either type of dyestuff.

Therefore, in the selection of a wetting agent it is necessary to know considerably more than the wetting efficiency of the agent in purewater at room temperature.

When we turn to the field of detergents or scouring agents we find they are related in chemical structure to the wetting agents. Like the wetting agents, they have long hydrocarbon chains with a water solubilizing group on one end. Furthermore, practically all detergents have wetting action. The reverse is hardly true as there are many wetting agents that have very little detergent action.

The purpose of a detergent or scouring agent is to remove foreign material from a surface by a process of dispersing or emulsifying this foreign material. Detergents are used almost entirely in aqueous systems. The behavior of a detergent will, therefore, depend upon the properties of its water solution. Its use will be limited by these properties. Thus if the calcium and magnesium salts of a given detergent are insoluble, the use of the detergent will be limited to soft water unless it is used in large excess to precipitate all the hardness from the water. In the paper making industry where cold water is used, surface active chemicals must be soluble in cold water and must perform satisfactorily in cold water.

Detergents are used in the paper mill to wash felts, to remove slime from pipes and chests, for general cleaning of equipment, and to some extent for deinking.

Felt washing is usually carried out with cold or lukewarm water and usually with softened water. The felts themselves may contain lime, aluminum salts, resins and other filling materials. This requires a detergent which is not sensitive to lime and one that has the power to emulsify the resins. Good rinsibility is also important. The alcohol sulphates meet these requirements, since they have excellent solubility, resistance to hard water and good emulsifying power. For special cases where the felts contain pitch or asphalt, grease, and oil, the addition of a solvent along with the detergent is desirable.

A typical formula for felt washing is as follows:

Washing on Machine
50 gals. water at 125 deg. Fahr.
1½ lb. "Duponol" E S Paste
5 lb. soda ash

Washing on Washer
200 gals. water
3 lb. "Duponol" E S Paste
6 lb. soda ash

In many detergent operations it is desirable to control the *p*H of the detergent bath. In felt washing the *p*H affects the quality of the paper due to its effect on the prop-

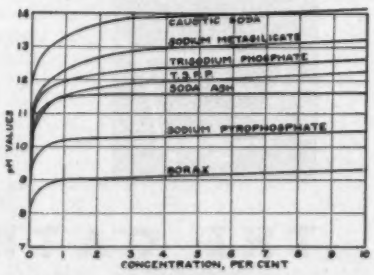
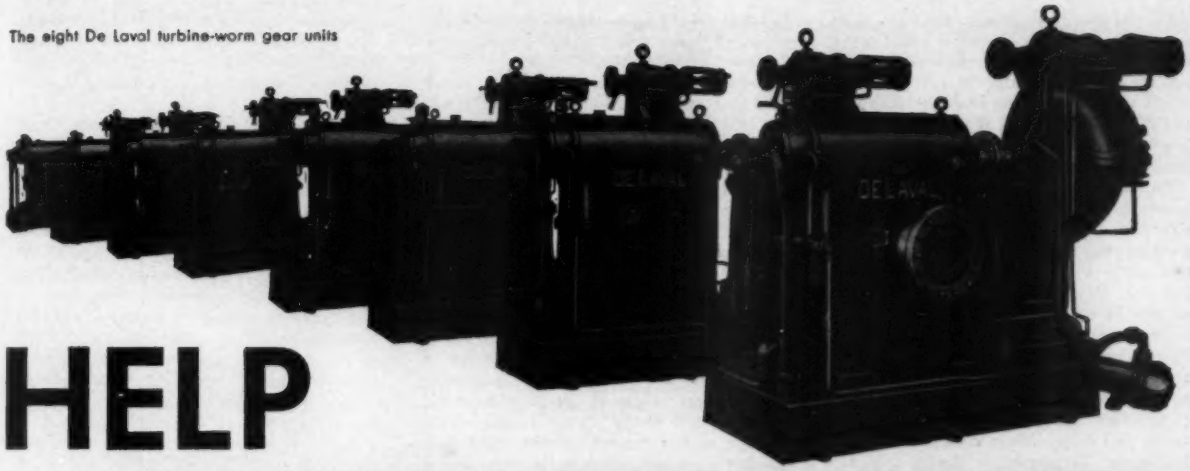


Figure 3

erties of the felt. However, the *p*H is usually varied in accordance with the soil on the felt, which in turn usually depends upon the type of size in paper. Felts used in making hard papers usually require a higher alkalinity for scouring because they are loaded with size, and it is a well established fact that alkalies are an aid in scouring for many types of soil. But too high an alka-

The eight De Laval turbine-worm gear units



HELP *in a* TIGHT SQUEEZE

REQUIRING more steam, but lacking space for more boilers, the engineers of a blast furnace plant decided to increase the fuel-burning and steaming capacity of the existing boilers by raising them to gain furnace volume and by installing induced draft fans. Then it was found that there was scarcely space for the fans and for turbines with speed reducers to drive them.

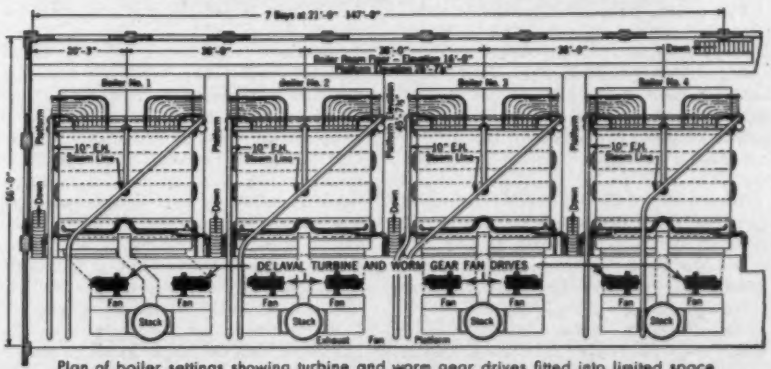
The problem was solved by selecting

DE LAVAL
VELOCITY STAGE TURBINES
driving through
DE LAVAL WORM GEARS

The right-angled drive permitted placing the turbines alongside the fans, while the hydraulic governors of the turbines are well suited for automatic speed control to give a draft range of 4 to 1. Each unit has forced feed lubrication from a De Laval-IMO oil pump, which also supplies oil for governing.

Write for leaflet 1-3515 "Modern Turbines to Reduce Costs".

Four of the eight 185 hp. turbines driving fans through 6 5/6 to 1 ratio worm gears



Plan of boiler settings showing turbine and worm gear drives fitted into limited space between boilers and fans

DE LAVAL *Steam Turbine Co.*
TRENTON, N. J.

MANUFACTURERS OF TURBINES — STEAM, HYDRAULIC PUMPS — CENTRIFUGAL PROPELLER, ROTARY DISPLACEMENT, MOTOR-MOUNTED, MIXED FLOW, CLOGLESS, SELF-PRIMING, CENTRIFUGAL BLOWERS and COMPRESSORS GEARS — WORM, HELICAL and FLEXIBLE COUPLINGS

linity will modify or damage the felts. Unless accurate control is exercised in a paper mill in weighing out the alkali and adjusting the pH, it is safer to use an alkali which will not give too high an alkalinity. The curves (Figure 3) will give the maximum pH developed by several common commercial alkalies.

In many applications of surface active agents it is desirable to have a product which is a good detergent as well as a good wetting agent. The alcohol sulphates sold under the trade name of "Duponol" and the alkyl sulphonates are especially suitable in such cases where both high detergency and rapid wetting are required. This is important in felt washing, especially when the washing is done on the machine so that there is little time for penetration.

Softening agents are similar to wetting agents and detergents in chemical structure. In fact the "Duponols" or alcohol sulphates made from long chain alcohols are excellent softeners Softening agents as a rule have a longer hydrocarbon chain which results in lower solubility. Aside from dyestuffs, softening agents probably give fibrous materials their most distinctive properties. By the proper selection of softening agent it is possible to obtain a soft flexible sheet with a pleasant hand, where otherwise a harsh unpleasant sheet might result. The choice of a softening agent for a given product will depend upon the use to which the product is to be put, but two important characteristics are resistance to rancidity and resistance to discoloration. For this reason chemically stable softening agents are usually desirable.

It will thus be apparent that there are many opportunities for improving the qualiyt of a product or for saving time and labor by the judicious use of a surface active chemical.

The Equipment for Storage and Distribution of Liquid Alum in the Paper Mill

E. V. WHITE
Consulting Engineer

The current progressive tendency of the paper industry to encourage the chemical industry to supply it with liquid alum to replace the conventional dry crystal alum has stimulated widespread interest among the paper mill superintendents as to the proper design of equipment for storage and distribution of liquid alum in the paper mill.

To respond to the paper mills' transition to liquid alum, one large manufacturer is currently building five liquid alum plants near paper centers in Ohio, Michigan, and Wisconsin. Another large manufacturer is currently purchasing five tank cars for all transportation of liquid alum in Texas. Other alum plants are under consideration to make feasible furnishing liquid alum to additional paper mill centers.

In most instances, the paper maker uses the alum at the concentration delivered by the manufacturer, namely, alum at the 4½ pounds per gallon dry basis, but in some instances, the alum is further diluted with water to a lower concentration of 2 pounds or even 1½ pounds per gallon dry basis with the intent to more accurately proportion the alum by reducing the effects of careless volume measurement, and with the intent to reduce the corrosive properties of the alum.

Liquid alum is delivered to the paper mill at a savings of approximately $4 per ton basis dry crystal alum quantities, which savings are made possible because alum is originally produced in a liquid state and costly thickening, crushing, storage, and bagging operations are eliminated.

That additional operating savings favor use of liquid alum is borne out by many existing mill installations where the dry crystal alum is dissolved in separate agitated tanks and distributed by pipe line to the measuring tanks and beaters.

The essential elements making up a liquid alum system are simple, consisting of pipe lines to convey the alum from the shipping tank to the storage vessels, of the storage vessels proper, of the pipe lines to convey the alum from the storage vessels to the measuring tanks, of the measuring tanks proper, and of the pipe lines to convey the alum from the measuring tanks to the beaters.

In some cases, the location of equipment allows dual service of pipe lines for conveying alum to the storage vessels, and conveying alum from the storage vessels to the measuring tanks by proper use of valves.

The storage vessels should be designed of sufficient capacity to store a minimum of one week's supply for mills readily accessible to the alum plant, or to store a minimum of two weeks' supply for mills remote to the alum plant, in order to offset occasional winter transportation delays or other abnormal delays. If less storage capacity is installed, the mill should carry sufficient stock of dry crystal alum to provide a safe margin.

Where the volume of alum used is sufficient, it is recommended that two storage vessels be utilized rather than a single vessel in order to insure continuous operation of the storage equipment in the event maintenance outage develops. Satisfactory and economical design of a storage vessel consists of an open top, vertical, cylindrical, flat bottom vessel having approximately equal diameter and height; the vessel shall have a single outlet nozzle in bottom of the shell for connection to pipe line conveying the alum to the measuring tanks. Under no circumstances is it acceptable practice to equip storage vessel with sightglass, due to the hazard of breakage and consequent spillage of a large volume of corrosive liquid alum. It is good practice to install a reliable valve directly on the nozzle outlet of the vessel so that flow of alum from the vessel can be stopped if pipe line maintenance becomes necessary, or if an accident should occur in the distribution system.

It is recommended that storage vessels be elevated a sufficient height to permit gravity flow of the alum to the measuring tanks on the beater room floor where existing elevated floors of ample structural strength are available, otherwise the storage vessels can be located on the basement floor and alum delivered to the measuring tanks by means of centrifugal pump having motor control wired for remote pushbutton stations located adjacent to the measuring tanks; for such pumping installations, it is customary to allow the pump to run continuously during the periods of frequent alum usage to conserve time, and since the electric power consumption becomes negligible while the pump is churning against closed valves.

The measuring tanks have very small capacities ranging from 25 to 75 gallons. Design of a measuring tank consists of an open top, vertical, cylindrical, flat bottom vessel designed so that the height of the vessel considerably exceeds the diameter of vessel, thus introducing smaller errors in volume for a given inaccuracy in gauging the depth of the liquid. Gauging can best be accomplished by simply immersing a calibrated rod into the liquid if the top of the measuring tank can be made readily accessible, or by equipping the measuring tank with a visible sightglass in front of a calibrated gauge if the measuring tank is elevated and inaccessible, since the sightglass will not be subject to likely breakage, and even in the event of breakage, the volume of spillage would be of little consequence. Float gauges are discouraged, due to inadequate corrosion resisting chains.

The bottom of the measuring tank must be elevated a sufficient height to permit gravity flow of the alum to the beaters, and it shall have a single outlet nozzle in the flat bottom for connection to the pipe line conveying the alum to the beaters. The exterior of the pipe line directly above the beater should also be of corrosion resisting construction, because it will be subject to splashing and vapor contact. It is good practice to install a valve directly on the nozzle outlet of the measuring tank so that entrapped air in the distribution lines will not impede the accurate determination of the volume.

It is recommended that materials of construction for storage and measuring vessels be chosen in the order of their preference, as follows:

1) Steel vessels lined with rubber of suitable grade, whereby the rubber is integrally bonded to the steel during the process of vulcanization;
2) Steel vessels lined with lead of suitable grade, whereby the lead is not bonded to the steel, but is suitably attached to the vessel at intervals to lend structural strength to the lead;
3) Pine wood tanks lined with lead of suitable grade, whereby the lead is not bonded to the wood;
4) Cypress wood tanks having no lining.

Likewise, it is recommended that materials of construction for pipe and fittings be chosen in the order of their preference, as follows:

1) Steel pipe with integrally bonded rubber-lining, or rubber acid resisting hose with continuous external supports;
2) Steel pipe with homogeneous lead lining;
3) Heavy lead pipe with continuous external supports;
4) 14½ per cent silicon-iron.

Likewise, it is recommended that materials of construction for valves be chosen in the order of their preference, as follows:

1) Rubber-lined valves;
2) Stainless steel valves of the high nickel - chromium - molybdenum - low carbon type, with iron content less than 50 per cent;

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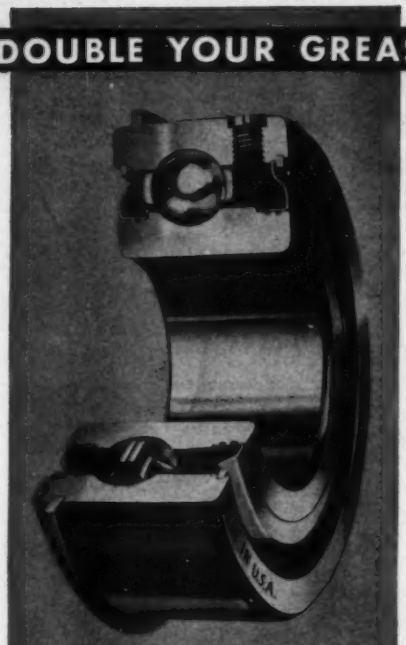

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SOME OF THEIR ADVANTAGES:

Can be packed with at least 100% more grease than any self-sealed bearing—especially adapted, therefore, for continuous service for long periods.

Provide positive protection against foreign matter and absolute retention of lubricant—by the use of flanged metal shields, recessed inner ring construction, and two or more grease grooves—the combination affording a truly effective labyrinth.

Are equally efficient in retaining grease in horizontal or vertical position.

Metal shields, though rigidly locked by snap rings, are removable to facilitate inspection, cleaning or re-greasing of bearings.

Can be quickly regreased, either through "built-in" refilling plug opening or by removing metal shields.

Require no lock nuts on shaft or clamping means in housing, because of wide contact areas due to double-row width of both rings—which also prevent "cocking", slippage or "peening".

Reduce costs by simplifying design, eliminating protective closure parts, and saving attendant labor.

Available with shoulder ring, thus permitting a through bore in housing, the shoulder ring providing endwise location.

NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U.S.A.

Write for Catalog F-951 on Cartridge Precision Ball Bearings

3) 14½ per cent silicon-iron cocks.

Likewise, it is recommended that materials of construction for pumps and circulating air jets be chosen in the order of their preference, as follows:

1) Stainless steel of the high nickel-chromium - molybdenum - low carbon type, with iron content less than 50 per cent.
2) 14½ per cent silicon-iron.

From the above recommendations, it will be noted that rubber-lined steel equipment has been given the first preference for all functions excepting pumps and circulating air jets.

Lead is a construction material likewise chemically inert to alum, and like rubber, is commercially bonded to steel under shop conditions to furnish the lining with needed rigidity and structural strength, but its excessive cost as compared to rubber-lined steel eliminates it from common consideration for storage vessel construction.

Unlined cypress wood tanks are not generally recommended for storage of liquid alum, having the concentration generally delivered by the manufacturer, namely, 4½ pounds per gallon dry crystal basis; even when the alum is further diluted to a lower concentration, it is difficult to keep the tanks tight against leakage because alum shrinks the wood, and causes the stave joints to progressively spread open from the inside of the tank to the outside.

Regarding comparative installation costs using the commonly considered materials of construction, when the cost of rubber-lined steel construction is taken at 100 per cent, it may be expected that unbonded lead-lined steel or wood vessels with lead piping and rubber-lined valves will cost approximately 70 per cent, and that unlined wood tanks with lead piping and rubber-lined valves will cost approximately 35 per cent.

When the liquid alum equipment installation is being considered from an investment viewpoint, current experience indicates that for mills whose average alum consumption ranges from 75 tons to 750 tons annually basis dry crystal quantities, that it will take from one to three years to amortize the investment for a rubber-lined steel installation based on direct savings accruing from the purchase of liquid alum; the above takes no account of the substantial operating savings resulting from the use of liquid alum.

Newsprint

H. G. CRAM

This paper will be confined to a discussion of progress made in method and equipment during the last twenty-five years.

With only three or four large mills devoted entirely to newsprint, progressive development was quite normal until around 1914, when there began a period of intensive experimentation and development extending to around 1921-1922. During this period, four-foot wood came into general use; the drum barker was replacing the disc barker; chippers were increased in size and equipped with individual motor drive; the four-foot grinder replaced the two-foot type, to be replaced later by the magazine and semi-magazine types; the artificial stone came into being (presently close to 90 per cent of news groundwood is ground on this type of stone); flat screens were replaced with rotary type knotters and fine screens; lap pulp was rapidly being abandoned as an increasing proportion of the pulp was being delivered to the beater room in slush form; in the sulphite mill, temperature and pressure recorders were installed on the digesters, later to be still further improved by automatic steam flow and relief control equipment, presently culminating in the automatic predetermined cooking diagram; the use of pre-heated cooking acid together with circulating systems came into the picture; rotary knotters and screens replaced flat screens, and the sulphite was delivered to the beater room in slush form; and beaters were first replaced by large mixing tanks which were later replaced by the individual stock proportioning device for each machine until presently the beater room is practically non-existent.

Around 1914, there was a definite urge for higher speed and greater unit production on the machines; the rotary pump replaced the plunger type for delivery of stock to regulator box; the rotary screen replaced the flat screen; the high slice with adjustable lip was developed and the head-box improved; the removable fourdrinier came into being; suction boxes with composition covers and improved oscillating devices appeared on machines; the rotary type vacuum pump replaced the reciprocating type; the suction couch was adopted; and the first, and in a great many mills, the first and second presses were equipped with the suction roll.

Five-foot dryers came into being, bal-

anced and bored, with cut gears and improved bearings; the drum reel replaced the stack reel; and the unit electric drive came into the picture along with turbo- and motor-generator sets.

Comparative recent developments include the Down-Stream Shake, operating at high speed with a rather limited stroke. Drying has been improved both by improved ventilating systems and the Blo-Thru Type of Dryer Drainage System.

By 1934, speeds had increased to around 1300 feet in one or two mills.

In the finishing room, continuous finishing has replaced the single shift method, which, together with pneumatic roll headers, floor level track trucks and the electric roll truck, have reduced space for roll finishing by at least a half.

It is no longer essential that the plant be located at the power site.

What the next twenty-five years will bring forth in the manufacture of newsprint is speculative, but we may rest assured that it will be of considerable account.

Some Observations on the Relation of Coated Papers to Ink

F. A. WEYMOUTH
Products Development Laboratory
International Printing Ink
Division of Interchemical Corporation

A few years ago our laboratory checked hundreds of paper samples for gloss ink qualities, since there was no test to predict the ink gloss of paper. In information we released at that time for paper mills we mentioned several basic facts which today are still true and worth repeating.

"Paper is one of the largest factors in gloss ink printing. There is no substitute for a good gloss paper. Absorbent paper will nullify the effort of the best gloss ink to obtain gloss.

It has been erroneously thought that any paper which is suitable for spot or spirit varnishing is suitable for gloss inks. This does not necessarily follow, for pigments compounded in gloss varnish have a decided tendency to lower the gloss. Paper made for varnishing should not be recommended for gloss inks until it has been checked with gloss inks.

There is no known instrument or combination of instruments commonly used in testing papers which will predict the ink gloss of paper. It has, therefore, been necessary to develop our own method of testing. This method uses two testing inks in a printing test on the paper in question, comparing same with a standard test paper, both being printed at the same time and in the same manner. In addition to the printing test, we also apply the pick test to the standard and to the unknown papers using Dennison Waxes."

Further details on gloss problems, with test prints and the testing inks or the services of our laboratory are still available to all paper mills.

Last year our laboratory made a study of all the offset papers offered by 25 leading paper mills. These papers were submitted to the following standard paper laboratory tests:

Surface *p*H (acidity or alkalinity)
K&N Ink Absorption Test
Drying Tests with two kinds of inks (synthetic and linseed vehicles)
Carlson Size Curl Test (on uncoated papers only)
Pick Test (Dennison waxes)
The following papers were examined:

Number of Each Type of Papers Tested	Name	Average *p*H (acidity or alkalinity)	Average Pick Test
14	Poster Papers	4	11.2
47	E. F., M. F., and Super Uncoated Litho Label	4.4	12 (range 6 to 24)
2	Patent Coated Boards	3.5	15
1	Tag Paper	4	20
78	Bond, Ledger and Regular Uncoated Offset	4.6	16 or above
38	Litho Label C-1-S	7.2	7.3
13	Enamel C-2-S	7.7	7 (range 6 to 8)

The drying tests of the two inks correlated with the K&N Ink Absorption tests showed that the more absorbent papers dried the fastest. The slowest drying papers were the rag content bonds. In general, all coated papers (C-1-S and C-2-S) dried in about the same length of time and more rapidly than the uncoated. The uncoated papers dried from slow to fast depending upon the degree of absorption. The test inks were printed on all samples the morning of the same day (the temperature 85 deg. Fahr. and relative humidity 45).

Tests revealed that the mill claim for good varnishability was not always well founded. Possibly this came about because the standard for gloss or lack of spottiness may not have been high.

During 1939, a survey of the various Nos. 1, 2, 3 and 4 enamels made in this country was made in connection with our work on halftone blacks.

Nearly all the coated two side papers made in this country were examined. Sixteen leading coated paper mills were contacted who submitted 73 samples, representing at least 90 per cent of the domestic coated two side papers. Included in the tests were:

17 Samples of No. 1 Enamels
14 " " No. 2 Enamels
19 " " No. 3 Enamels
16 " " No. 4 Enamels
1 " " "B" Grade Super
5 " " Machine Coated Papers
1 " " Engravers Proving Enamel

The enamels with but few exception were 70 lb. papers, there being seven 80 lb. papers submitted. The following tests were run on these papers: *PICK TEST*—Run on both sides of the paper with both Dennison waxes and Dr. Case waxes. The following averages were obtained with the Dennison waxes:

No. 1 Enamel—5.76 pick test
No. 2 Enamel—5.93 pick test
No. 3 Enamel—6.26 pick test
No. 4 Enamel—6.31 pick test

Dr. Case waxes were also run on both sides of these papers and while they did not always correspond in every instance, the following general comparison was made:

Dr. Case Yellow Wax—Dennison Wax No. 4
" " Red Wax—Dennison Wax No. 5
" " Blue Wax—Dennison Wax No. 6
" " Purple Wax—Dennison Wax No. 7

There has been some criticism by mills of the practice of checking the pick test of papers by waxes. However, we have found that the large number of commercial complaints on picking show low wax pick tests. The printer does not have trouble with halftone blacks picking on papers with wax tests of 5 or 6 but he does with those of 2, 3 and 4.

In the study of *p*H we found a limited number of papers whose *p*H was near the neutral point. As far as printability is concerned, we feel that *p*H has little influence.

One half of the papers submitted contained calcium carbonate.

Smoothness tests were taken with the Schoenberg Color Analyzer.

Smoothness tests were made with the Bekk instrument.

Ink setting measurements were taken by printing a black ink with a solid plate and the time measured in seconds taken for the ink to entirely disappear from the paper surface.

Hardness tests were made with the Fuess instrument.

The averages on 73 papers were obtained as shown in table below.

Ink absorption tests were made with the K&N Ink.

A printing plate was developed for the printing plate test because we found it is impossible to obtain a halftone plate in various screen sizes which will duplicate each other. This plate contains various screen sizes in successive steps. The critical part of the plate will be found in the 70 and 85 per cent screens. The perfect paper will print the 85 per cent screen open and the solid part adjacent to it smooth and dense without any mottle. The 175-line screen and even the 150-line screen are seldom used commercially but they do make excellent tools for our comparisons.

In an attempt to correlate all of the previously mentioned tests we printed two inks on both sides of all samples submitted. One ink was a good grade of highly toned commercial linseed halftone black which we have sold in large quanti-

	Brightness	Smoothness	Ink Setting	Hardness
No. 1 Enamel	90.1	1034	35	25.18
No. 2 Enamel	89.1	948	26	24.50
No. 3 Enamel	88.1	1047	51	25.63
No. 4 Enamel	86.1	992	50	26.81

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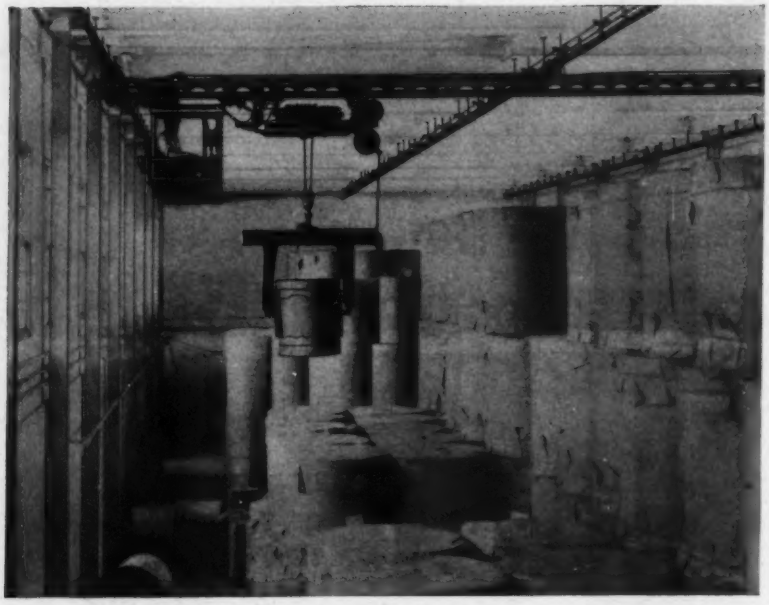

SAVES $10,000 PER YEAR

In this paper bag factory, a three-runway motor-driven crane with a one-ton electrically-operated carrier and paper-roll grab, are controlled by one operator in the carrier cab. Complete coverage of the 5,000-roll storage area is provided.

The grab is designed to permit the cab operator to rotate the load from vertical to horizontal or vice-versa.

A saving of $10,000 per year was made through increased handling efficiency and elimination of damage losses due to crushed edges, cuts, tears, etc.

You, too, can save with Cleveland Tramrail. Our representative will gladly discuss with you this and other cost-cutting paper-handling equipment.

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ties. The other was a fast-drying Vaporin type black. The tests were made on a No. 4 Vandercook proving press which has a power driven ink distributor.

After extensive printing tests, we could say that, in general, the No. 1 enamels as a group were better printing papers than the No. 4 enamels. However, there were isolated cases where better results were achieved on the lower priced enamels than on the higher priced papers.

A question frequently asked is: "How should any paper be made for Vaporin printing, absorbent or non-absorbent?" The answer to this question is that as long as nothing is done to impair printability or ink receptivity the paper can be made non-absorbent. Our observation is that mills in making their papers more non-absorbent usually impair printing qualities.

The use of black ink or black with colors on machine coated papers is now a common practice in high speed printing. More recent in development is four color process heat-set printing on both sides of the web with a gas flame drying the first four colors before the second four are printed on the reverse side. The web is then dried on the second side and folded into signatures or cut and delivered in large sheets.

A general statement would be that the large bulk of magazine machine coated papers print better than Super or English Finish and not as well as No. 4 enamels. Our impression is that the use of machine coated papers will continue to increase.

Paper Coating Pigments

A. E. HUGHES and H. F. RODERICK
Michigan Alkali Company

The requirements and specifications laid down for pigments by most producers of coated paper are very exacting. The pigments must be:

1) Readily and easily dispersed in water.
2) Free of grit and abrasive materials.
3) High in opacity and covering power.
4) Of a desirable particle size.
5) Low in alkalinity, with a *p*H value not very far above the neutral point.
6) Medium in adhesive requirement or size demand.
7) Medium in water absorption.
8) Bright and possess no noticeable off-color.

Many other requirements may be mentioned, but they are not essential for keeping within the purpose of this paper.

Pigments which meet these requirements and are suitable for use in the preparation of coated papers are clay, satin white, calcium white, calcium carbonate, titanium dioxide, blanc fixe and lithopone.

Both domestic and foreign clays are widely employed and serve as a basis for most coating colors. Clays are classified into various grades by particle size, and some are chemically treated, bleached and refined. Most clays, even after treatment, are almost invariably an off-white in color and low in brightness. Therefore, other pigments of high brilliance are often employed along with clay for improving the brightness as well as other properties of the finished paper.

Satin white is one of the oldest pigments known in the coating industry, aside from clay, and it still enjoys a wide use because it can be substantially relied upon for improving the finish of most coated papers as well as for improving the brightness of those carrying relatively large amounts of clay.

Satin white is readily prepared by reacting hydrated lime and aluminum sulphate and adding small amounts of gum arabic or some other dispersing or stabilizing agent. Its preparation is no longer considered a major problem in most paper mills.

By virtue of the fact that it is a good brightening agent and may be obtained in various grades at reasonable prices, calcium carbonate is widely employed as a coating pigment. It may be used alone or may be blended with other pigments in the preparation of coating colors. Comparatively recent developments in the manufacture of this pigment have made available various grades ranging from coarse, dull finishing materials to those possessing a high degree of brightness and opacity and which may be employed in the preparation of coated papers high in smoothness, ink receptivity and finish.

Blanc fixe is somewhat higher in price than the pigments just described, but, because of the fact that it possesses certain desirable properties, quantities are employed in coated papers.

Various grades and types of lithopone are available, and for certain types of coated papers this pigment is desirable.

Of all the pigments suitable for coating paper, titanium dioxide has decidedly the highest brightness and opacity or covering power. However, because it is rather ex-

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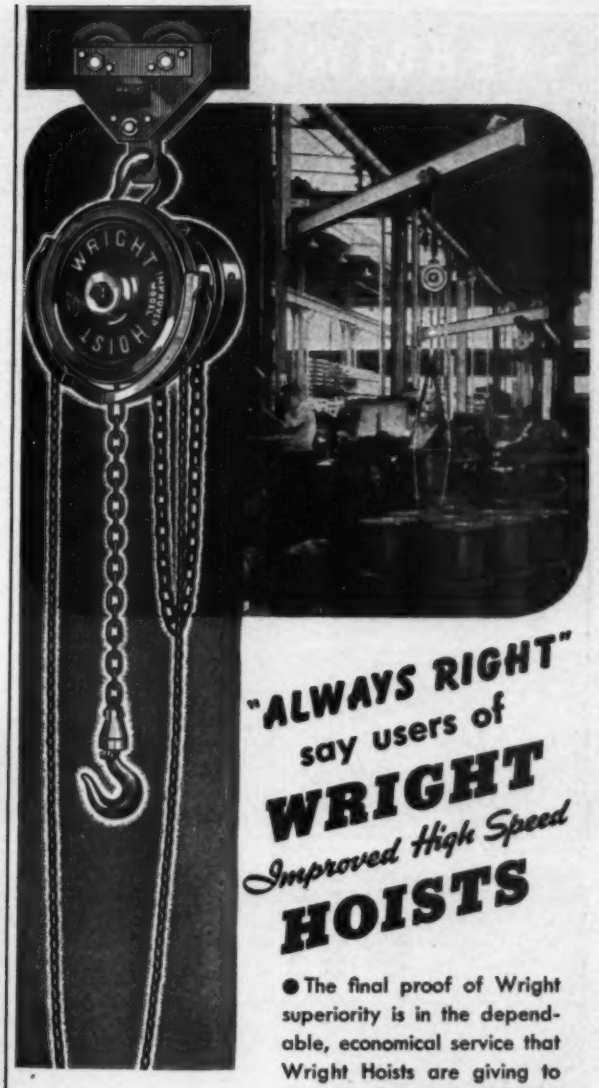

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pensive, its uses are limited, being confined to specialty papers and as an extender for less expensive pigments.

While certain properties of various pigments may be readily described, it is virtually impossible to arrive at a definite comparison of any number of pigments without resorting to laboratory and mill tests. We have, therefore, selected a paper coating grade of each of the above-mentioned pigments and evaluated it by laboratory means. These laboratory evaluations are being verified wherever possible by actual mill runs, and, while the problem is by no means completed, we do feel that our findings in the laboratory are worthy of presentation at this time.

The comparison of the individual pigments was made by preparing coatings from each of the pigments with varying amounts of casein and brushing these coatings onto a standard raw stock at the rate of 16 lb. per 500 sheets 25x38 in.

The evaluation of the raw stock employed is:

Basic weight (25x38—500)	41.5 lb.
Bursting test	16.3
Tear (in grams):	
Machine direction	30.0
Cross direction	35.4
Thickness	.004 in.
Size test (dry indicator)	26.7 sec.
Porosity (Bekk)	27
Smoothness (Bekk)	25
Opacity	87
Brightness	81

All test sheets prepared were calendered by a paper mill on a regular calender stack. The finished sheets were evaluated according to TAPPI standards, and the results are given in graphical form so that they may be the more readily comprehended.

Titanium dioxide, lithopone, blanc fixe and domestic clay are classed as having a low casein requirement. English clay and calcium carbonate are medium in casein requirement, while satin white is a high casein requirement material. In arriving at the amount of adhesive required by a certain mixture of pigments, it is by far the safest plan to prepare the blend and run a size demand test on the blend itself.

Brightness, or a high degree of whiteness, is essential in most coated papers. Satin white, titanium dioxide and calcium carbonate are the highest in brightness of all the pigments studied. Increasing amounts of casein cause a gradual decrease in brightness of the finished sheets for all of the pigments.

Satin white, titanium dioxide and calcium carbonate are higher in opacity than the remaining materials. Any increase in opacity gained by virtue of reducing the casein content is not to be confused with the actual opacity of a given pigment.

The ink receptivity of coated papers is a function of the degree of sizing as well as the nature of the pigment or pigment blend employed. Calcium carbonate and satin white are much more receptive to ink than are the remaining pigments. Aside from the fact that some pigments are more receptive than others, the receptivity is almost a linear relation of the degree of sizing for all of the pigments, being inversely related to the wax test.

In the preparation of coated papers from clay, it is usually necessary to add some brightening agent, such as satin white, calcium carbonate, or titanium dioxide. Such a procedure may be termed a blending of the pigments. A familiar example of extending pigments is the addition of calcium sulphate or blanc fixe to a more expensive material such as titanium dioxide. The extenders commonly used are those which will not have a great tendency to lower the properties of the pigment being extended. However, to the paper coater these terms are synonymous, since he is interested only in a mixture of pigments which will produce a finished sheet possessing certain characteristics.

In accordance with this purpose, we have prepared blends of calcium carbonate with varying amounts of titanium dioxide, clay lithopone, satin white and blanc fixe. The coated papers prepared from these blends were all sized to the same degree (4 to 5 wax pick) regardless of the amount of casein required.

Those coated papers possessing the highest brightness are prepared from blends of titanium dioxide and calcium carbonate, while the blends with satin white are also very high. Clay, lithopone and blanc fixe have a tendency to lower the brightness of coated papers when blended with calcium carbonate in increasing amounts.

It is obvious that calcium carbonate may be employed as a brightening agent for clay, blanc fixe, and, to some extent, lithopone. If it is essential that higher brightness values than are possible with calcium carbonate be attained, it is necessary to resort to satin white and titanium dioxide. As far as we know at the present time, the upper limit in brightness would be that of 100 per cent titanium dioxide.

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Higher opacities are obtained by blending calcium carbonate with titanium dioxide or satin white, while clay and blanc fixe have a tendency to lower the opacity as they are employed in increasing amounts with calcium carbonate. Therefore, calcium carbonate may be employed to increase the opacity of clay and blanc fixe coatings up to a certain point, beyond which it would be essential to employ satin white and titanium dioxide.

The highest values for ink receptivity are obtained with calcium carbonate blended with satin white. The remaining pigments lower the ink receptivity when blended in increasing amounts with calcium carbonate. Satin white and calcium carbonate may be incorporated into most coatings for the purpose of increasing the ink receptivity.

Satin white, when blended with calcium carbonate in small amounts, shows a decided improvement in gloss. Clay and titanium dioxide also show an improvement, but it is not so pronounced as with satin white, and larger amounts of these materials are required. Lithopone and blanc fixe show only slight improvements in the gloss values when incorporated with calcium carbonate.

Satin white and lithopone, when blended with calcium carbonate in increasing amounts, will improve the smoothness. Titanium dioxide has little effect on this value, while blanc fixe and clay show a tendency to lower the smoothness. Calcium carbonate is therefore a suitable pigment to incorporate with clay, blanc fixe and ti-

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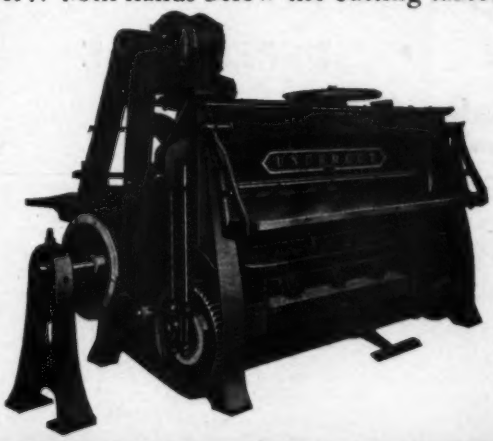

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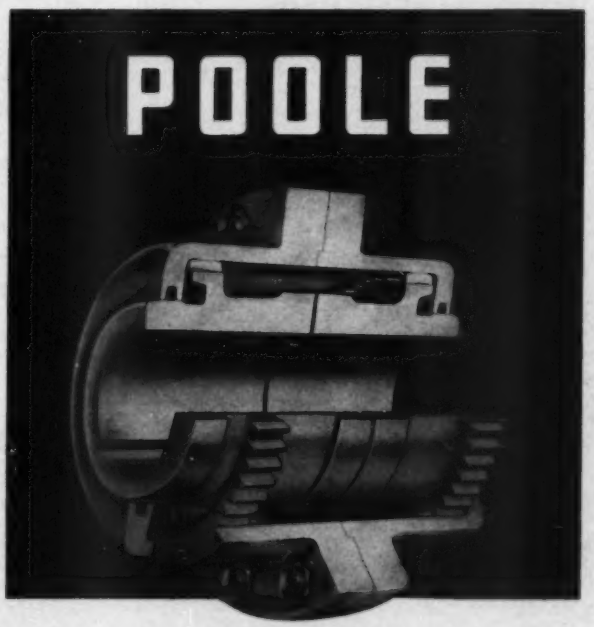

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Importance of pH and Catalysts in Bleachery Operations

JOHN D. RUE
Hooker Electrochemical Company

The term *p*H has taken on great significance for the pulp and paper maker. Its application will be recognized in water purification, sizing, dying, bleaching, washing pulp, and other phases of the processing. This paper will be limited, however, to the practical importance of *p*H in the bleachery operations.

We are all familiar with the rapid rate at which bleach liquor decomposes when the solution becomes too acid, as it may, e.g. if too much active chlorine is added to lime milk, a suspension of lime particles in a saturated solution of lime. Lime is only slightly soluble in water and the *p*H of such a lime milk is about 12.5. When chlorine is added it reacts with the dissolved lime to form hypochlorite. More lime dissolves but not quite rapidly enough to keep the solution saturated and the *p*H decreases slightly. When all the lime is dissolved, the *p*H is between 11 and 12. A small further addition of chlorine causes a rapid drop in the *p*H. If the chlorination is stopped at any *p*H above about 11.2, the solution is reasonably stable unless the temperature is too high. If, by the further addition of chlorine, or by the addition of an acid, the *p*H continues to fall below 11.2, the solution becomes increasingly unstable, especially in contact with some metals or in the presence of impurities such as compounds of iron, manganese, nickel, or copper which may come in with the lime or water. Hence, the importance, when making bleach liquors, that the solution be brought to the proper "end point." If the end point is passed, stability can be re-established by restoring the desired *p*H by the addition of lime. This must be done promptly if excessive loss of available chlorine is to be avoided. Any chlorine that may have become inactive will not again be made active by the restabilization of the solution.

The end point can be determined by means of the glass electrode, but the method is not well adapted to rough mill control. Color indicators are valueless in the presence of the bleach liquor. Fortunately the commonly used phenolphthalein "flash test" is satisfactory. When phenolphthalein is dropped on bleach liquor and the pink color disappears in three to four seconds,* the solution has the desired *p*H of approximately 11.2. That is a practical test procedure which any operator can successfully apply.

Now let us see what takes place when we reverse the procedure and start with a solution of chlorine in water and gradually add an alkali such as lime. Most of the chlorine is merely in solution, but some has reacted with water to form hypochlorous and hydrochloric acids. Hypochlorous is a weak acid and, in the small concentration found here, has a negligible effect on the *p*H. The hydrochloric acid gives the solution a relatively low *p*H (about 1.5 in a solution containing 5 gpl chlorine). The addition of lime neutralizes the hydrochloric acid and as a result more dissolved chlorine goes over to hypochlorous acid and the *p*H gradually increases.

At *p*H 5 the solution, as far as active chlorine is concerned, is essentially one of hypochlorous acid. Dissolved chlorine has disappeared and the hydrochloric acid has formed inactive calcium chloride. Further addition of lime changes the hypochlorous acid to calcium hypochlorite and the *p*H again increases. At *p*H about 9.6, all the hypochlorous acid has formed calcium hypochlorite. Further additions of lime increase the *p*H by reason of the presence of increasing quantities of free lime. At *p*H about 12.5 further addition of lime will no longer dissolve and will remain in suspension. The solution at this point is practically the same as the one just before all the lime is dissolved when adding chlorine to lime to make bleach liquor.

The composition of the solution as regards active chlorine may be summed up this way. Below *p*H 3 it contains chiefly dissolved chlorine; between 2 and 4 it contains a mixture of dissolved chlorine and hypochlorous acid; at 5 it is chiefly hypochlorous acid; between 6 and 8 it is a mixture of hypochlorous acid and hypochlorite; and above 9 it is chiefly hypochlorite. Those relationships exist whether we add chlorine to lime milk or add lime to chlorine water.

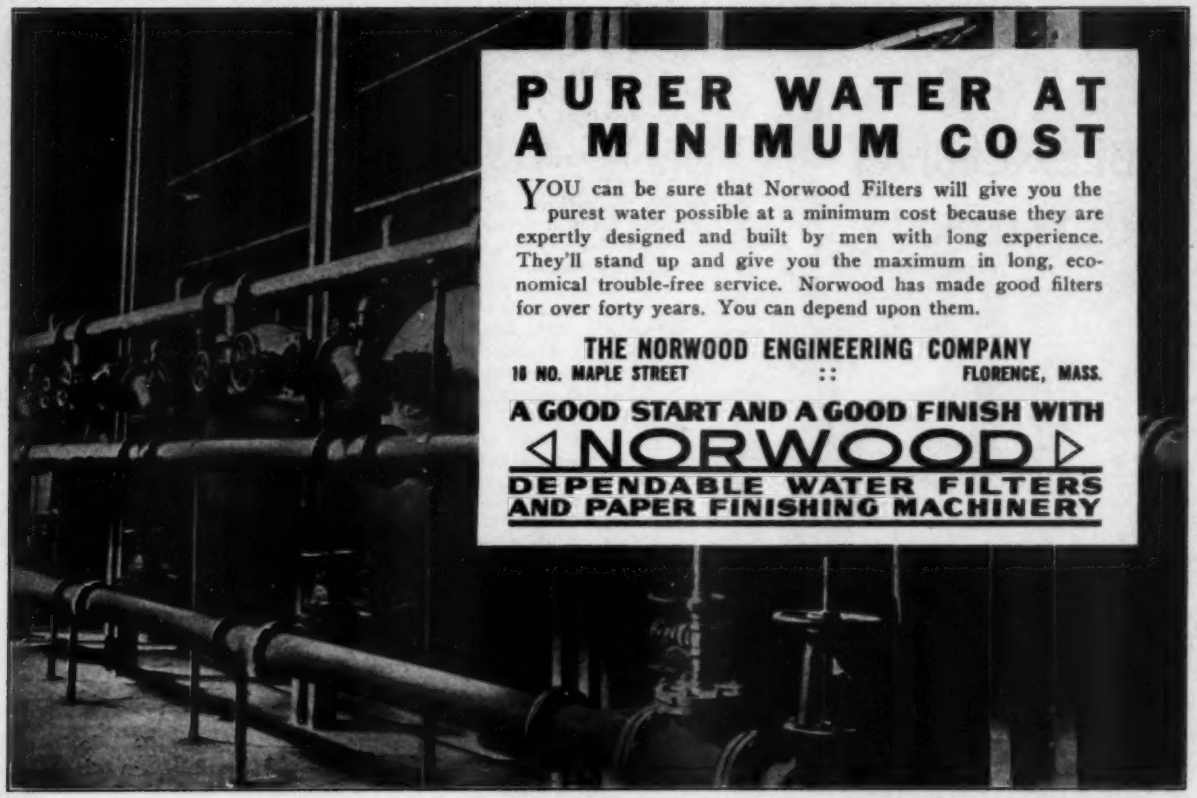
Chlorine or chlorine water, when added to a water suspension of pulp, chlorinates the lignin but has no appreciable effect on the cellulose. The reaction is rapid even at room temperature or below. The chlorinated lignins are soluble for the most part, either in water or in an alkaline solution. Here we have the basis for the first stage in a purification and bleaching procedure, i.e. the chlorination stage, which provides an excellent means of removing the lignin with a minimum of attack on the cellulose.

Hypochlorous acid and calcium hypochlorite are oxidizing agents. They dissolve lignin and discharge the color of impurities but do so by decomposing them through oxidation. Those chlorine compounds react also with cellulose but less rapidly than with lignin and the colored impurities. In the bleaching stages, it is of vital importance, therefore, to establish conditions which will permit the removal of impurities before the cellulose has been attacked. Hypochlorous acid is a more rapid oxidizing agent than calcium hypochlorite and it is difficult to find conditions under which its action on the impurities can be completed before it has attacked the cellulose to a harmful degree. Furthermore, hypochlorous acid shows a marked tendency to react with itself to liberate oxygen which escapes as a gas, or to form chloric acid which reacts too slowly to be a bleaching agent. In either case, some of the chlorine becomes ineffective for bleaching.

Calcium hypochlorite, however, oxidizes rapidly but not so rapidly as to prevent a reasonable degree of preferential attack on the impurities. For that reason, the hypochlorite bleaching stages are operated in a *p*H range in which the chlorine is in the form of hypochlorite.

Bleach liquor, as we have seen, always contains some free alkali to prevent loss of active chlorine. When the liquor is added

*Bleach liquor at 30 gpl available chlorine and 80 to 90 deg. Fahr. For other conditions the flash period must be emperically adjusted.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to any well washed, unbleached or partially bleached pulp, the free alkali is sufficient to establish in the pulp mass, a *p*H of 8 or higher. As the bleaching proceeds, the *p*H decreases rapidly and then more slowly. During nearly half of the bleaching period, the *p*H is below 7.

The *p*H decreases as the result of the appearance of acids. CO_2 is one of the chief offenders. It is formed when the hypochlorite oxidizes the organic matter just as in the more violent action of burning. One or more weak organic acids are also formed by bleaching reaction. Furthermore, hypochlorite itself becomes less alkaline as it loses its active oxygen.

The effects which these *p*H changes have on the bleaching reactions and on the strength properties of the bleached pulp may be very undesirable. The net results are low brightness except with the consumption of excessive quantities of bleach, low strength of bleached pulp and lack of uniformity of quality of the product.

There is a simple way in which the unfavorable conditions in the bleaching stage can be corrected and that is to prevent the excessive decline in *p*H by the addition of an alkali to the pulp. Experience shows that the *p*H should, at no time during the bleaching period, fall below 7.5 or 8. From the standpoint of strength of product, an even higher *p*H is desirable but may involve an extended bleaching period and difficulty in washing out the soluble impurities. To add, at the start of the bleaching, alkali in sufficient quantity to prevent the *p*H from falling below 8 may cause so high an initial *p*H as unduly to retard the rate of bleaching. That difficulty is overcome in practice by adding only a portion of the alkali at the beginning and the remainder in one or more portions later in the bleaching period.

For the control of *p*H during bleaching some mills use caustic soda and some lime. Both give excellent results as far as the bleaching is concerned.

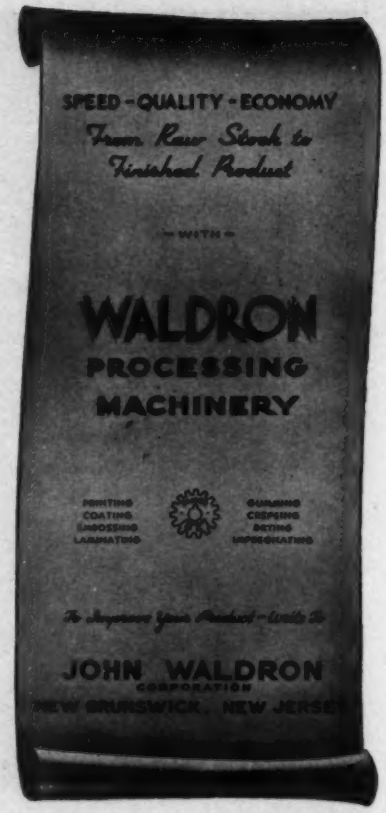
The quantity of alkali required to maintain the desired *p*H will depend on the thoroughness with which the pulp to be bleached has been washed, on the quantity of bleach required, and on the kind of alkali used. Under normal conditions the quantity will bear a fairly definite ratio to the quantity of active chlorine used. That ratio will be of the order of magnitude of 0.2 to 0.3 lb. of calcium oxide or its equivalent per pound of chlorine.

The use of too much alkali will greatly retard the rate of bleaching and may so extend the reaction period as to cause a loss of pulp strength as well as a reduction in the equipment capacity. An increase in temperature will shorten the bleaching time but may do so at a sacrifice of brightness and strength.

Occasionally the term chlorination is incorrectly applied to a procedure in which the chlorine is injected directly into the pulp suspension. Some high grade de-inked paper stock is treated in that way. There is no appreciable quantity of lignin present to be chlorinated and the reaction is really one of oxidation. The alkali used in the de-inking process is not completely removed by washing and when chlorine is added forms a hypochlorite which bleaches in the normal manner. The quantity of chlorine required is small and insufficient to lower the *p*H into the range favorable to chlorination. In other words, the operation is merely one of making bleach liquor in the presence of the pulp. Larger proportions of bleach liquor can be made in the same way provided the necessary alkali is first added to the pulp.

In some cases it is desirable to allow the chlorination of chemical wood pulps (at *p*H of about 2 or less) to proceed for a short period and then, before exhaustion of the chlorine, quickly to change the *p*H by the addition of an alkali to something greater than 8; in other words to change the reaction from chlorination to oxidation. That is not an important procedure in the bleaching of sulphite but may be of vital significance with kraft, especially when the product must possess the combined properties of high brightness and high strength.

In many cases it is desirable to bleach kraft to some extent but not to a high degree of brightness. For the lower shades the impurities need not be completely removed and it is important from both an economy and a quality standpoint that the greatest possible brightening be obtained per pound of chlorine used. One factor which contributes to the attainment of this objective, is to maintain a *p*H that will ensure that no chlorine is lost by the formation of gaseous oxygen or of chlorates or is wasted in the unessential purifying operation of chlorination. Here again the *p*H should not be permitted to fall below 8. As the demand for brightness increases, the quantity of bleach liquor required is increased but there is a limit to the brightness that can be attained by this simple procedure and at the same time retain the full strength of the product.



Hypochlorites and hypochlorous acid suffer more or less decomposition under normal conditions but the rate of decomposition is greatly increased in contact with certain metals. Typical of these are iron, copper, nickel, manganese and some compounds containing them. Bleach liquor brought into contact with a clean iron surface will evolve oxygen fairly rapidly. Fortunately, an iron surface in contact with a lime bleach liquor soon becomes coated with rust and calcium salts and the catalytic action of the iron ceases to be evident. Some iron tanks have been in successful use for years for making and storing bleach liquor. However, iron tanks are not good for settling the liquor. Some points on the metal become exposed and oxygen is given off. The rising bubbles keep the sludge from settling well.

Iron from pumps, valves and piping, to handle bleach liquor are also satisfactory. Here again the iron becomes inactive by the formation of a hard protective coating. Iron in contact with other metals, however, may result in some decomposition of the liquor and also in corrosion of one of the metals. All-iron pumps or all-bronze pumps have shown good life and service, but iron pumps with bronze runners have been known to require frequent replacements of the iron parts.

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ful when the pulp is held for any appreciable period of time within a *p*H range of 4-7 as evidenced by a loss in efficiency in the consumption of chlorine and in a loss of pulp strength.

In the bleaching and purification procedures, the impurities are brought into a soluble form by the various chemical reactions that take place, but they still have to be separated from the fibers and that is not always an easy thing to do even with the excellent modern washing facilities that are available.

Here we have the basis for the practice, which fortunately is becoming more widespread, of washing twice with a soaping period between. The practice is especially important when using the modern vacuum type washers which effect the displacement of the impure water very rapidly and provide little or no time for diffusion through fiber walls.

Application of multiple stage washing is, for economic reasons, limited to those cases where exceptionally thorough removal of impurities is essential or where separation of the impurities from the fibers is unusually difficult. Among the impurities difficult to remove are those which are formed by the hot extraction of the pulp with caustic soda. The more drastic that treatment, the more non-alpha material is dissolved and the greater the difficulty in washing the pulp. Some of the colored impurities removed from kraft pulps by this procedure dissolve with difficulty and the double wash with intermediate soak is highly important as a preliminary to the attainment of a high degree of brightness combined with high strength of pulp.

The demand recently has been for ever increasing degrees of brightness and for greater stability of brightness when the pulp or paper made from it is stored. The pulp therefore must be delivered from the bleachery with impurities removed to a degree not heretofore considered essential and in their removal *p*H plays an important part.

The concluding stage in the usual bleaching procedures is a hypochlorite bleach. Modern practice calls for the operation of that stage in such a way that the stock, as it reaches the washer, has a *p*H greater than 7. Free alkali has a tendency to put the cellulose in a condition to increase the forces which attract and hold the soluble impurities to the fibers. If, however, the *p*H is reduced to less than 7, say to between 6 and 6.5, removal of those impurities takes place more easily, and so it has become accepted practice, especially when bleaching kraft to a high brightness, to double wash at the end of the bleachery procedure and to adjust the *p*H to the acid side during an intermediate soak of 20 minutes or more at relatively low stock density.

Some of the impurities themselves behave as color indicators and become brighter at a low *p*H but darken again when the original *p*H is restored. For that reason, the brightening effect produced by the addition of an acid may be completely lost when the acid is later washed out, especially if the wash water is slightly alkaline. But that brightening is not to be confused with the more permanent effect which follows the actual removal of the impurities, an effect which is improved with washing and which contributes to the stability of brightness when the product is stored.

The acid which, especially in the bleaching of kraft, is preferred for *p*H adjustment, is sulphurous. It is formed when sulphur dioxide is injected into the pulp suspension. Its importance lies partly in the fact that it serves two other purposes: it acts as an antichlor and thus protects the fibers from the harmful effects of any unconsumed chlorine that may have escaped removal by the first wash; and, it tends to reduce ferric iron to ferrous which is more readily separated from the fibers. Ferric iron is usually present in kraft pulps in considerable proportions and if not removed or reduced may discolor the pulp or catalyze reactions during drying or subsequent storage that will impair the strength of the fibers.

What Has Caused the Recent Interest in Bacteria in Paper Board?

HARRY C. FISHER, Chief Chemist
The Gardner-Richardson Company

We now are presented with the problem of speaking numerically and qualitatively about the content of bacteria or other microorganisms in paper or board. Even though to the unaided eye the sheet may appear to be as clean as freshly bleached fibers it may have a content of invisible matter which makes it unallowable, if not unsuited, for certain uses.

As one mill man expressed himself: "In recent years we have learned to make paper passing tests we can see, appreciate, and even feel, like Mullen, Tear, Smoothness. Now we are asked to make paper to pass tests we cannot see." Such is the price of progress.

Any discussion of the bacteriological or, more correctly, the microbiology of paper, sooner or later encounters the paper milk container. No doubt, to many of us, the current interest in sanitarily clean board is a new thing; on the other hand, it is an old story to those who have made paper or board for ice cream and oyster pails, bottle caps, butter cartons, etc. It is the paper milk container that has focused attention to the sanitary quality of paper board.

Some of the milk bottle board made during the early days of the present develop- had a bacterial colony count much greater than is considered allowable now but there are no instances known where the health of anyone suffered from drinking milk from a container made from such board. A couple of years ago, a bacterial colony count of 500 per gram of paper board came to be considered a fair standard for milk container board. Then, in 1939, the United States Public Health Service proposed a standard of 100 colonies per gram of paper and the figure finally adopted is 250 per gram. We are assured by the United States Public Health Service that a revision of this figure up or down will be made upon cause.

To be strictly correct, the title of this paper should refer to microorganisms instead of bacteria inasmuch as the bacteria are but one class of microorganisms. Microorganisms, which are those tiny organic bodies so small as to be seen only under a very powerful microscope, include the bacteria, yeast, molds, algae, fungi, etc. They are measured in terms of the micron, a micron being 1/1000 of a millimeter of 1/25,000 of an inch. Many of these microorganisms are the friend of man. Some of these microorganisms, under the influence of environment unsuitable for continued growth and increase in numbers, pass into a spore stage, a sort of seed stage, and there they remain dormant or inactive until such time that favorable conditions again promote their resumption of activity as a living, active, reproducing microorganism. On the paper machine, the heat and steam of the dryers, the chlorine or other bacteri-

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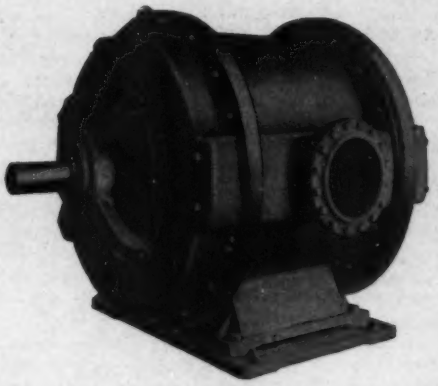

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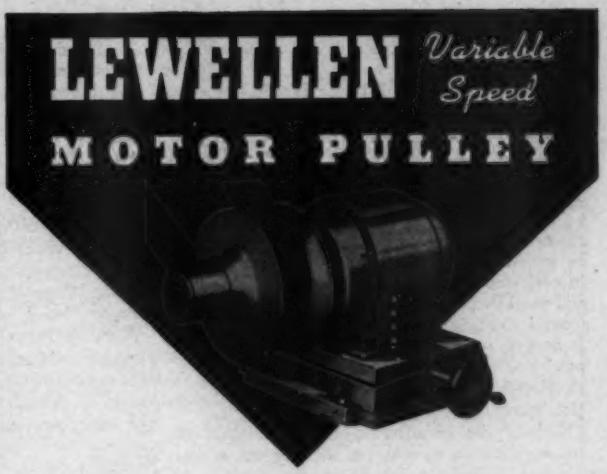

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Features that mean trouble-free service

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cidal treatment of the stock, the low water content of the finished board, the absence of food in the paper to support life of microorganisms, etc., lead to the destruction of all but the most resistant kinds of organisms. Certain kinds of spores are resistant and thus much, if not all, of the so-called bacterial content of paper board will be composed of spores.

"How is paper or board examined for content of microorganisms or bacteria?" In its essentials the answer is simple but in performing the tests much care and skill and considerable equipment are required. If more information than mere colony count is needed, such as the identification of the particular kinds of organisms present in a sample, the service of an expert bacteriologist is required.

In brief, the procedure for making a plain colony count is to pulp or disintegrate a piece of the paper or board in water, to mix a small portion of the resulting pulp with a mass of food, in melted condition, suitable for feeding and growing the microorganisms, to allow the mixture of paper pulp and food to cool to a gelled condition in a Petri Dish, to place the dish and contents in an incubator in which the temperature remains constantly at 37 deg. C. for forty-eight hours, and finally to remove the incubated plate and actually to count the colonies, that is, groups or spots of microorganisms, which have developed and grown from the individual organisms or spores present in the sample of paper or board. Knowing the weight of sample used and number of colonies counted, the result is expressed as the number of colonies per gram of the original sample. The whole procedure must be carried out with sterilized instruments and equipment and with the specialized technique of the trained bacteriologist.

While the test results of a colony count are expressed quantitatively, the interpretation is largely qualitative. If one sample of milk container board tests 200 colonies per gram and another 100, it hardly follows that the latter is twice as clean as the former. The interpretation is that both are very clean. But if several samples of the former consistently test around 200 colonies and, of the latter, consistently test around 100, one can reasonably conclude that the conent of microorganisms of the former indicates it to be appreciably cleaner than the latter, although the difference is slight.

It is stated that the paper container for milk made its first appearance in this country in 1909, in California, where a man named Maxwell proposed the use of a cup-like paper milk bottles which he treated with melted paraffin to waterproof it. Freedom from germs was stated to be an advantage of this paper container. Due to commercial difficulties, this early paper container was not successful and it was not until 1929 that paper milk containers again became prominent, this time in the eastern part of the United States. It was not until 1935 that the paper container for milk became a recognized factor in the dairy industry. Now the use of various shapes and kinds of paraffined milk containers has grown to such an extent that at present some two million are used daily throughout the United States. There has also been a wide use of such containers in foreign countries.

There has been a surprisingly large amount of study and research by institutions of high rank on the micro-biology of paper and board and products made therefrom. Among these are:

University of Illinois—under Doctors Taner, Prucha and Tracy.

The Institute of Paper Chemistry at Appleton.

New York State Agricultural Experiment Station—under Doctors Breed and Sanborn.

Sanitary Committees of the National Paper Board Association and The American Paper and Pulp Association.

The writer wishes to acknowledge these various sources for much of the information contained in this present talk.

The bacteriologist recognizes two general divisions of microorganisms—the pathogenic or disease-producing organisms and the non-pathogenic ones, or those not producing disease. We are assured, on good authority, that the pathogens never, or rarely, survive the punishment they receive in the paper making process. Experiments have been reported wherein paper leaving the press roll section of a paper machine has been inoculated with strains of pathogenic bacteria and the bacteria could not be found by bacteriological tests after the paper had passed over the heated paper machine dryers. Such tests, together with a consideration of the heat and steam conditions of a drying web of paper or board on the paper machine dryers, and a knowledge of the thermal death point of various organisms, have established quite conclusively that common pathogenic organisms are killed on the paper machine dryers.

So far as the pathogenic microorganisms are concerned, the process of paper-making contains natural safeguards. The use of chlorine and ammonia and the various chemicals which have toxicity to certain microorganisms can be relied upon to maintain the wet end of the paper-making system in a clean condition. Thereafter, the heat of the paper machine dryers can be relied upon to kill pathogenic bacteria. A natural safeguard automatically comes into play on the paper machine dryers. If the paperboard leaves the dryers too wet, it can not be calendered and is not satisfactory for use, regardless. If the web is dried sufficiently and properly so that a usable sheet of board results, such conditions of temperature and time will have prevailed on the dryers that pathogenic bacteria or similar microorganisms will have been destroyed.

A sheet made from fresh, clean pulp in a clean beater room with a clean wet end system furnished with unpolluted water, well chlorinated, free from slime, accumulations of old stock, etc., will show a comparatively low colony count, say a couple of hundred down to none. The latter sheet, formed into a container and treated with clean, hot, melted paraffin, is an eminently satisfactory container for liquid foods.

Virgin stock is a phrase which has come into use in recent years in connection with paper and board low in colony counts.

Virgin stock is defined as stock which never before has been used for commercial purposes. Such would include fresh, clean bleached or unbleached sulphite, sulphate, groundwood, soda and aspen pulps, etc. Trim from unconverted board made of such stock can be considered to be virgin stock. Slush stock fed directly from the pulp mill answers to the definition. No doubt, an extension of the classification to include other suitable grades of fibrous material will arise in time.

Chemicals, size, clays, starches, etc., added to the stock in the beater room ordinarily do not cause serious contamination although one cannot disregard the possibility. It is not alone a question of their own ability to cause contamination but also the cleanliness of the equipment and methods of handling.

The recently revised Federal Food, Drug, and Cosmetic Act has occasioned discussion among technicians with reference to microorganisms and color of paper and board, especially after conversion into cartons or other containers.

The limitations of colony counts and specification of stocks used for liquid food cartons is a reasonable device designed to prevent foreign tastes and odors and to aid the natural safeguards of the paper-making process. Foods of low or negligible moisture content do not present the same problem as liquid foods; the absence of sufficient water militates against microbiological life. Inasmuch as the colony count in paper and board is largely, if not completely, due to harmless spores, it seems farfetched to think that any microbiological content of paper or board can be deleterious or poisonous to food.

Colored boards also need comment in connection with the Food, Drug and Cosmetic Act. Customers are prone to inquire whether board of this or that color can be guaranteed to be satisfactory under provisions of the Act, for packing a given kind of food. A comprehensive answer to customers' question sounds evasive; a simple answer cannot be given. Apparently there is no law dealing specifically with the question.

Although the paper maker cannot blindly guarantee his colored product as satisfactory for holding customers' food, for example, under the Food, Drug and Cosmetic Act, he can ascertain, in a practical way, whether it is likely to be satisfactory. If there is no possibility of contamination of the food by adsorption of dye and/or accompanying substance from the wrapper or container, these cannot act to contaminate the food. If the coloring matter is known to be non-poisonous, intrinsically, if it is firmly "set" onto the fibers, if it does not smudge, "bleed" or rub off onto the food, especially when warm, wet, or moist, and over a long period of time, then the chances are that the colored paper product will withstand scrutiny under the Food, Drug and Cosmetic Act. It is a good rule to make a detailed study of each coloring job proposed and to enlist the aid of the person who packs the food or other article in the colored paper or board.

EDITOR'S NOTE: Publication of abridgments of papers presented at the annual meeting of the Technical Association held in New York City, February 19-22, 1940, will be continued in the next issue. Previous installments of these abridgments have appeared in the March, April, May and June issues.

*How Warren's Pump Audit**

SAVED $200 A MONTH

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POWER losses up to $200 a month were recently revealed in one mill by Warren's Pump Audit*. The loss was caused by inefficient operation of six 30 hp. centrifugal pumps. After thorough study of the requirements and operating conditions, Warren engineers recommended pump replacements that increased operating efficiency by 10% and turned the loss into a saving.

*The *Pump Audit* is a valuable service offered exclusively by Warren: a practical method designed to (1) put your pumping costs *on record* (2) permit an accurate check for excessive maintenance or power consumption (3) reduce your pump operating costs through improved efficiencies. Send for Warren's P. A. Data Sheet, and full facts on how the "Audit" can cut costs in your mill. No obligation.

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Every time it leaves the bunch,
It gets skinned.

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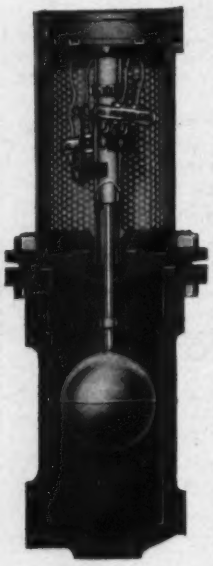
NEW EQUIPMENT AND SUPPLIES

Liquid Level Control

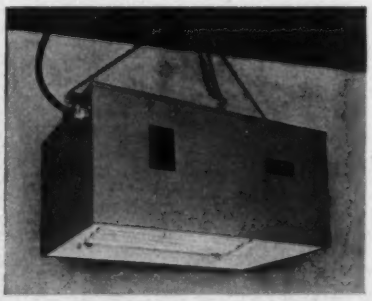
A liquid level control, designated as the *Schaub Magnetrol,* has been announced by Fred H. Schaub Engineering Co., 325 West Huron Street, Chicago, Illinois. This control consists of a float and magnetic relay arrangement, so assembled that switching action is obtained through the rise and fall of a piston attached to a float rod moving up and down in an inclosing tube. As the piston reaches a predetermined level in the tube, it comes into a magnetic field produced by a magnet located on the outside of the inclosing tube. When this occurs, the magnet is drawn toward the piston, thereby causing a tilt action of a mercury - to - mercury switch.



The control is made in two models. One model has a single switching action which may be used as a low-water cutoff on a steam boiler or to operate a pump or an energized valve in connection with a tank or other liquid level application. The other model incorporates three stages of liquid level control for use as a low-water cutoff, pump control, and high-water cutoff on boilers or for stage control on other liquid level applications. An alarm circuit may also be incorporated in either one of these models.

Color Matching Lamp

Color Analysts, Inc., 610 Bloomfield Avenue, Bloomfield, N. J. has announced the development of a lamp for use in the matching of colors. Known as *Analyte,* the



lamp is designed to produce a soft, diffused but penetrating white light through the use of gaseous discharge tubing of clear glass. The tubing, bent in the form of a grid and covering the entire area of the reflector surface, is held in place by spring clips. Mazda lumiline lamps are installed in the reflector. The reflector surface is of white porcelain; the outside surface, a baked wrinkle finish of neutral grey. The lamp, manufactured under U. S. Patent No. 2,139,732, is air cooled and insulated to insure cool operation. Model J-201, designed to be suspended, operates on 115 volt 60 cycle alternating current, and requires a line of 40 ampere capacity. The actual power consumption is 1700 watts.

Mercury Clutch or Coupling

Mercury Clutch Corp., Massilon, Ohio, has announced the development of a clutch or coupling which permits a driving motor to gain speed before assuming load. This device consists of four principal parts: a driving member or housing, a driven member or inner drum, clutch segments, and mercury. The mercury is introduced into the assembly or removed from it through filler holes.

In operation, the mercury displaces the clutch segments inward where they engage the drum, a positive drive being effected when the speed of the housing and driven drum are synchronized.

According to the manufacturer, time or speed of engagement may be predetermined; also overloads and other shocks are not transmitted through unit to prime mover.

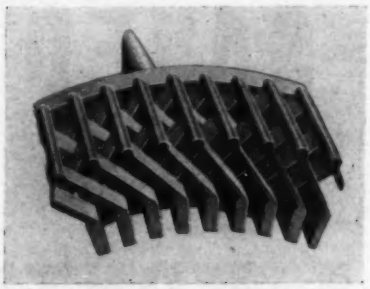
The unit, at present, is made in two standard sizes, 4 in. and 4½ in. diameter, either of which will transmit loads up to 5 hp. Larger sizes are available on specification.

Non-Alcoholic Solution of Iodine

A non-alcoholic solution of iodine, known as *Isodine-Davis,* has been announced by the Davis Emergency Equipment Company, 55 Van Dam Street, New York, New York. This preparation, according to the manufacturer, has the same antiseptic properties as tincture of iodine, but is less painful when applied, does not burn or destroy tissues, and penetrates more deeply. It is supplied in 2 cc. and 10 cc. applicators, and in unit cartons containing 10 swabs, each of which represents an individual treatment.

Improvement in Induction Motor Construction

A new type rotor construction, which offers the advantage of longer motor life with less maintenance, has been announced by General Electric Company, Schenectady, New York. Known as the *Valv-Amp Rotor,*



it makes possible the use of cast aluminum rotors in the larger sizes of double-squirrel-cage motors for high-starting torque, low-starting-current service. It makes use of a unique shape of rotor slot and a special method of assembling rotor punchings to control the flow of starting current. Without the use of a switch or other moving parts, current is permitted to flow in the outer squirrel-cage when the motor is started, thus producing high-starting torque. When the motor comes up to speed, current is allowed to flow through the entire rotor winding, resulting in excellent running characteristics.

Hand Truck for Paper Rolls

A hand truck for handling paper rolls has been announced by the Lansing Company, Lansing, Michigan. This truck, known as the *Norman,* has Hyatt bearings, 12 in. cast

wheels, steel angle legs and body, and a shoe (hinged nose) for slipping under roll being handled. Designed for a capacity of one ton and with the body and running gear as separate units, the truck can handle a load 83 in. long by 36 in. in diameter.

Polyvinyl Alcohols

A new series of water-soluble, water-dispersible vinyl resins, the polyvinyl alcohols, indicate promising applications in the paper industry according to an announcement from E. I. du Pont de Nemours & Co., Wilmington, Del. It is related in the same announcement that the alcohols make an excellent adhesive in pigmented coatings; that paper impregnated or coated with the resins show an increase in wet strength; that the series can be used for grease-proofing paper, paperboard and paper containers;

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Manufacturers of

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Pulp Grinders, Three or Four Pocket

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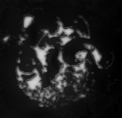
Write for descriptive literature

THE TRADE-MARK OF GOOD FELTS



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A Carefulness That Is Microscopic

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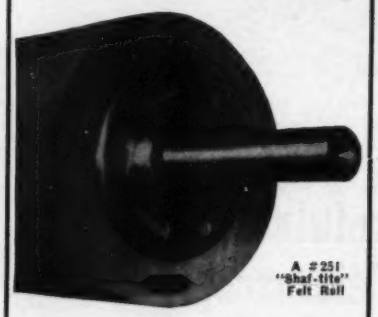

When customers report that "Shaf-tite" Felt Rolls will "out-wear 3 others" —"Best we have used in 40 years"— "still using original rolls purchased 16 years ago"—it explains just how valuable the patented "Shaf-tite" end construction is to roll performance.

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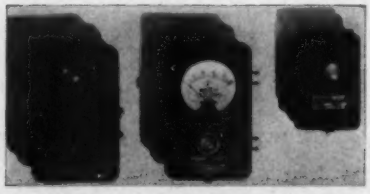
that the resins may be used as a softener and transparentizer in making glassine; and that polyvinyl alcohols alone, and in starch mixtures with insolubilizers, can be used for the surface sizing of high grade bond papers.

Polyvinyl alcohols are white to creamy white powders and are odorless and tasteless. They are available in a number of grades, and collectively are designated as PVA.

Smoke Meter and Alarm

Photoswitch Inc., 21 Chestnut Street, Cambridge, Massachusetts, has announced a smoke meter and alarm mechanism for indicating density of smoke passing through a flue and for lighting a red signal light when



the density exceeds a predetermined value. The mechanism consists of a photoelectric control, a meter-signal combination, and a light source. The light source and photoelectric control are mounted on opposite sides of the flue or breeching, and are aligned through simple entrance tubes or windows so that the beam projected from the light source strikes the eye of the control. The meter may be placed at any location in the boiler room, usually near the other furnace controls. It is wired to the photoelectric control. The equipment is supplied in dustproof housings, finished in dark green crystal.

Repair Material for Concrete Floors

A rapid drying, 100 per cent pre-mixed repairing material for holes in concrete floors has been announced by Rock-Tred Co., 629 West Washington Blvd., Chicago, under the name of *Speed-Patch*. According to the announcement, holes in concrete floors and outside drives and walks can be repaired with Speed-Patch in three minutes or less. The material is of soft, lumpy consistency that drives and hardens quickly upon being tramped into place.

Laboratory Test Gauge

A laboratory test gauge, guaranteed to within ¼ of 1 per cent of the scale range, has been announced by the Ashcroft American Gauge Division of Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut. The outer edge of the dial is a mirror on

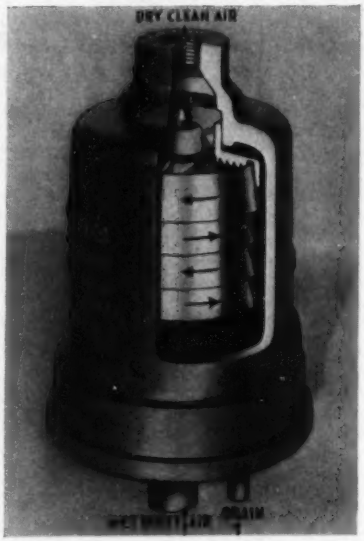
which the tip of the pointer reflects if the user is not in correct position to read accurately. In addition, the gauge has a case that is light in weight, and a molded transparent plastic cover which opens up the dial for easy reading.

Automotive Motor Oil

A motor oil, designed for the lubrication of automotive Diesels and gasoline engines in heavy duty service, has been announced by The Texas Co., 135 East 42nd Street, New York, N. Y. It is known as *Texaco 303 Motor Oil*, and, according to the manufacturer, it assures for cleaner engines and higher maintained efficiency over long periods of continuous service, with no harmful sludge deposits, and no carbon deposits. The manufacturer also states that the new oil will not break down under the higher speeds, temperatures, and pressures in the newer type of heavy duty Diesels and gasoline engines.

Moisture and Oil Separator

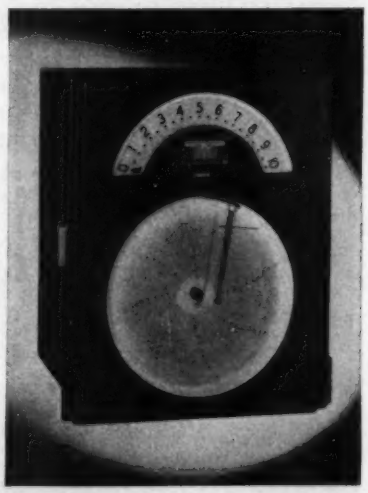
The Logan Engineering Company, 4912 Lawrence Avenue, Chicago, Illinois, has announced that its line of separators, known as *Aridifiers*, is made in a range of pipe sizes from ⅜ in. to and including 10 in. According to the manufacturer, all sizes effectively remove dirt, scale, oil and moisture from compressed air and gas lines, foreign matter impinging on a multiplicity



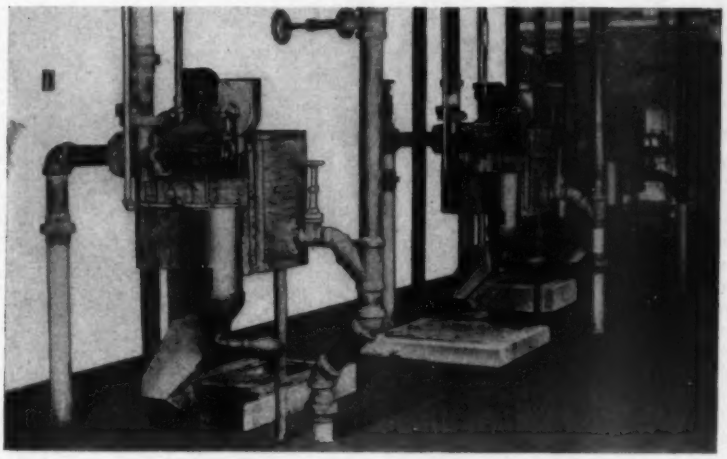
of propeller blades revolving in opposite directions and propelled by the flow of air or gas. The arrested contamination is collected in the lower housing from where it is drawn off as occasion warrants.

Mechanical Ring-Balance Meter

A mechanical meter of the ring-balance type, for metering steam, water, gas, air, etc., at static pressures up to 1,000 lb. per sq. in., has been announced by Republic Flow Meters Company, 2240 Diversey Parkway, Chicago, Illinois. The meter is housed



in a steel case suitable for exposed locations. It is adjustable by changing a calibrating weight, has a 12 in. graduated chart, and is furnished with any combination of indicator, recorder and cyclometer type integrator. The meter will give full scale readings on differentials as low as 3 in. of water.



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Regulators
On Board Mill
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WOOD

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

White Water Loss in Testing Mechanical Pulp

Tests were made by the standard methods devised by the British pulp evaluation committee and also by a modified procedure (which eliminates loss of fine material) on 84 samples of groundwood pulps made into handsheets. Excepting drainage time the differences are not great enough to affect control tests in mill operation, and there is no improvement in the correlation of properties. Difference in properties of the two sets of handsheets is normally not above 10 per cent excepting in the case of jack-pine, white birch, and the hemlocks. Largest differences seem to occur in the case of those species which give weak pulps showing high fines and high freeness. In general the standard tests are not invalidated; since, with the exception of tearing strength, the errors are in one direction only, and are quite constant over a wide range. The new method gives a slight advantage when it comes to accuracy in research work, but this is not very marked. The correlation of grinding conditions with pulp properties, or the inter-correlation of pulp properties was not improved by the use of values obtained on whole-pulp handsheets in preference to those obtained on standard sheets. W. S. Morris and R. de Montigny Pulp Paper Mag. Canada 41, 107-12 (1940).

Pulp Mill Wastes and Fisheries

These are two very long delayed reports from Sweden. One dates back five years, the other three years, and they have just now appeared in the American abstract literature. They deal with the physiological effects of pulp mill wastes on fish life. In the first one, various kinds of fish were used as experimental animals, and salmon appeared to be the most sensitive. The wastes were diluted with filtered sea-water. Acid sulphite waste liquor was found to be much more injurious than were soda wastes. While the latter show an immediate oxygen demand, this declines much more rapidly than does that of the acid wastes. The oxygen demand of fiber suspensions was low. Experiments carried out with powerful aeration indicated that fermentable sugars promoted the growth of fungi in sewage. Cellulose fibers did not injure the gills of fish. The toxic effects of sulphate (black) liquor was found greater than those of sulphite wastes. This (according to Ebeling and Klingstedt) is due to the presence of resin acids. In the second report, a comparative "poison unit" was used as a measure of the toxicity. The number of such "units" per liter originally present in some waste is indicated by the degree of dilution with sea water which is required so that young salmon can live for at least five days in the resultant mixtures. Condensates from digesters and (diffusers even after the removal of sulphite turpentine) were quite toxic. The various sulphur compounds (unless they are removed, which is quite possible) present in the wastes discharged from sulphate cooks impart not only an unpleasant taste to the polluted waters but to the meat of fish living in such waters. The toxic action of waste liquors is ascribed to resin acids, fatty acids and to oleic acid. Flocculation (with mineral acids?) often decreases this toxicity. (1) Sten Vallin. Kgl. Lantbruksstyrelsen. No. 5. 39pp. (1935); (2) Hilding Bergström and Sten Vallin. Ibid. No. 13, 17pp. (1937); through Chem. Zentr. 1938, II, 3438-9 and C. A. 34, 2596-7 (1940).

Permeability of Papers to Water Vapor

This is a study of the permeability of building papers. The resistance of sheathing papers is almost negligible, and accurate results cannot be obtained by the methods used. Asphalt-saturated rag felts show a wide variation in diffusion for different papers. Asphalt felt cannot be relied upon to act as a barrier, and there seems to be no correlation between thickness or weight and diffusance, although such a correlation may be masked by large variations in the individual sample. Asbestos felts (saturated with asphalt) showed marked individual variations, although three samples were quite impervious to water vapor. Low vapor diffusion was noted in the case of all asphalt saturated and coated sheathing felts, but asphalt saturated sheathing papers were fairly permeable. Kraft paper, asphalt saturated and coated, are vapor barriers. They all showed a black glossy surface, at which the asphalt formed a continuous film. That this surface film is responsible for the low diffusance is indicated by studying non-saturated asphalt-coated kraft papers, which have nearly the same resistance as the corresponding saturated papers. Tar-saturated rag felts and sheathing papers are in general very permeable to water vapor. Duplex papers in which asphalt lies between the two sheets of the kraft, are ordinarily quite impervious to water vapor. In light waxed papers, the surface film is instrumental in preventing diffusion. With heavier waxed papers, the absorption of wax causes a decrease in effectiveness. Heavy roofing papers are all excellent vapor barriers. "Infused" papers consisting of kraft waxed or unwaxed, one surface of which is infused with an asphalt preparation, ordinarily form strong vapor barriers. In all cases continuous films on the surface of the paper seem essential in

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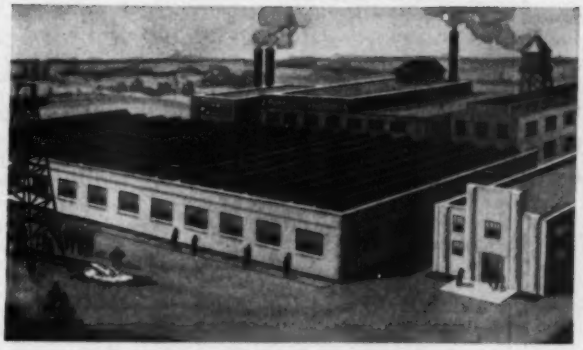

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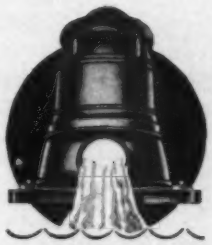

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rendering it impermeable. A paper to be considered an effective barrier must have a diffusance of less than 0.5 gm/24 hrs/sq meter/mmHg. J. D. Babbitt. Can. J. Research 18, 90-7 (1940).

Wood Sampling and Analysis

Samples were prepared by the use of the Wiley mill which has a cutting action and the Christy and Norris mill which has an impact action. It was found that with extreme fineness of division in the sampling process, there is some degradation of the Cross and Bevan cellulose, as shown in subsequent analysis. Samples which pass a 60-mesh screen and are retained on an 80-mesh screen, or simply all particles passing a 60-mesh sieve, are suitable for analysis, although in general the 60-80-mesh sample is preferable. When, however, woods contain very large amounts of extraneous material, the 60-mesh sample is the safer. W. E. Cohen and A. W. Mackney. J. Council Sci. Indian Research. 12,365-77 (1939); through C. A. 34, 2590 (1940).

Strength Properties of Fibrous Holocelluloses

Spruce shavings were used. They were first extracted with methanol-benzol and then treated alternately with chlorine and either 3% monoethanolamine and 0.5% NaOH, aqueous alkaline alone, or a saturated $Ca(OH)_2$ solution. A yield of over 63.7% holocellulose with 2.55% lignin was obtained by chlorination and alkali treatments, and by defibering the pulp mechanically, and using only the coarse fractions for further treatment. Although the yields are quite high, and the chemicals used are low priced, large scale operations do not seem economically feasible. The reactions are complex and require time. The strength tests were made on pulps containing 0.5% to 19% lignin, and conclusions have been drawn on the influence of such lignin contents on the properties of the pulp. High degrees S. R. are rapidly developed by pulps low in lignin, due probably to the high hemicellulose content. Folding endurance seems to be correlated with lignin content. Only those pulps which have less than 5-6% lignin have an appreciable folding endurance. However, this generalization cannot be applied to all types of pulp, since Mitscherlich spruce pulps with 7-8% lignin at times show very high folding endurances. As the lignin content of the holocellulose decreased from 19 to 0.5%, the breaking length increased 150%, bursting strength 225% and the stretch 150%. If the lignin removed during the last stages of the delignification of the pulps accompanied by attack on the cellulose, the strength maximum of the sheet lies in the region of 3-6% lignin. If, however, reagents are carefully chosen, and degradation studiously avoided, the maximum strength properties may actually occur when the lignin content is at its lowest point. C. Jayne and G. Schwab. Papier-Fabr. 38, No. 8, 48-50 (1940) through Bull Inst. Paper Chem 10, 325-6 (1940).

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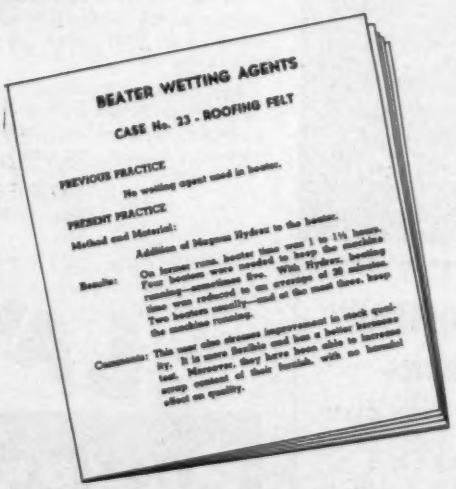

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Failure of Butt Straps in Sulphite Digesters

This is the continuation of an earlier investigation on the suitability of X-ray methods for detecting failures in butt straps. The nature of these cracks and the reasons for their formation were studied. In a crystalline material, these failures are classified into those accompanied and unaccompanied by deformation. The cracks occurring in butt straps do not seem due primarily to corrosion fatigue. They are formed largely by fatigue of the material with deformation between rivet holes, supplementetd by a tendency towards intercrystalline corrosion in regions plastically deformed. At the same time, they are influenced by elastic tensile stresses and by the presence of a corrosion medium. H. Swedenborg and C. Schaub. Svensk Papperstidn. 43, No. 4, 57-64 (1940) through Bull. Inst. Paper Chem. 10, 328 (1940).

Determination of Mechanical Pulp in Paper

This is based on the hemicellulose content of groundwood which may be hydrolyzed to reducing sugars. The weight of readily saccharified hemicelluloses is estimated by means of Fehling solution (as Cu_2O). Special graphs are drawn which serve to estimate the mechanical (and chemical) pulp in admixtures, by this control method. If acid soluble fillers are present in the paper, the methods cannot be used. R. Carlgren. Svensk Papperstidn. 43, No. 5, 93 (Mar. 1940).

Water Permeability of Insulating Materials

Description is given of an apparatus in which moisture passing through a film is carried by dry air into an excess of naphthalene phosphonyl chloride. Here the water reacts with the acid chloride and liberates HCl which is then absorbed in an excess of standard $Ba(OH)_2$ solution. The back titration is a measure of the passage of moisture. Cinnamyl chloride may also be used. With proper modifications, the apparatus serves to measure the passage of aqueous vapor or of liquid water. W. Nagel and E. Brandenburger. Wiss. Veroffentl. Siemens-Werken. 18, No. 2, 97-104. Wochbl. Papierfabr. 70, No. 51, 944 (1939), through C. A. 33, 8329 (1939).

Embedding Paper in Elder Pith

A description is given of embedding paper in elder pith, a technique often used by botanists. Specimens do not require chemical pretreatment which might otherwise interfere with the chemical or physical structure of the sample. Contrary to the botanists methods, however, the paper sample and pith are placed in the microtome horizontally which avoids curling of the specimen. Detailed procedures are given. F. D. Armitage. Patra J. 3, No. 3, 127-31 (Nov. 1939) through Bull. Inst. Paper Chem. 10,336 (1940).

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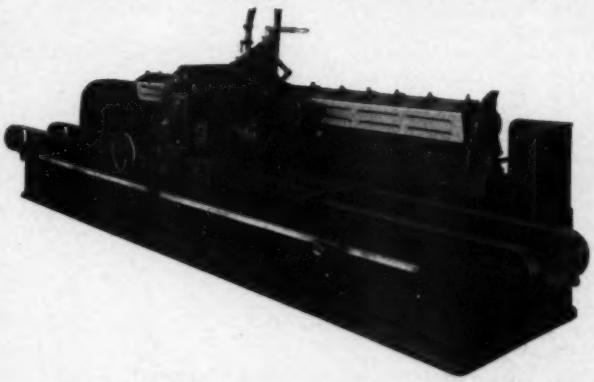

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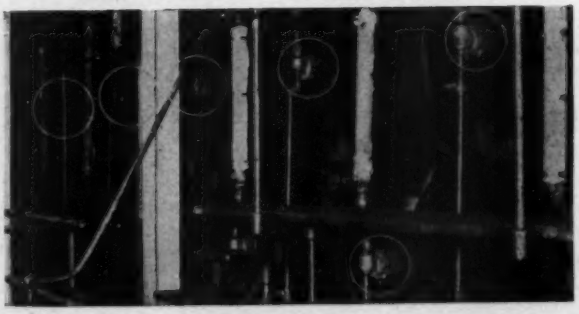

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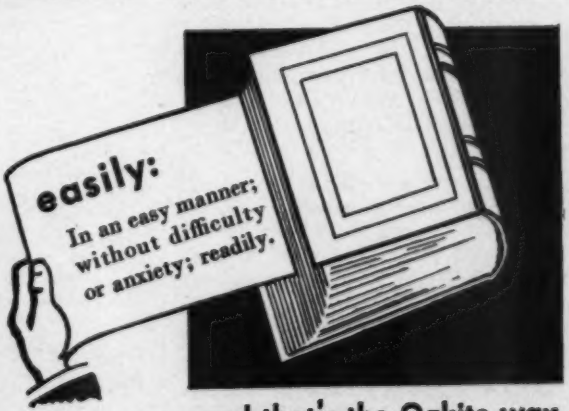

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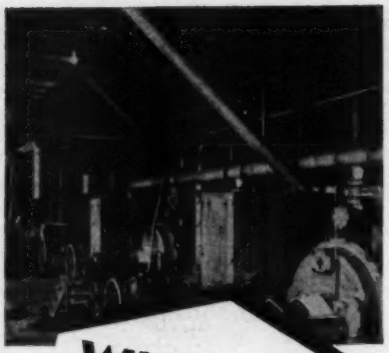

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PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Production of Acid for Sulphite Pulping Process

Patent No. 2,188,321. Walter H. Swanson, Menasha, Lloyd Lang, Kimberly, and Donald C. Porter, Appleton, Wis., assignors to Paper Patents Company, Neenah, Wis., a corporation of Wisconsin. Application July 22, 1937, Serial No. 154,965. 4 Claims. (Cl. 23—132). A process of producing sulphite acid having a high concentration of free sulphur dioxide which comprises passing cooled sulphur burner gas through a dissolving chamber counter-current to a flow of cooled water, the flow of water being so regulated that it will dissolve only that portion of sulphur dioxide to be used to produce the free sulphur dioxide component of the sulphite acid, passing all of the residual burner gas containing the undissolved sulphur dioxide directly to an acid-making tower to form the sulphite salt component of the finished acid, passing the solution containing the dissolved sulphur dioxide through a heat interchanger to raise the temperature thereof, passing the heated solution through a stripping chamber counter-current to a controlled flow of inert gas obtained from the acid-making tower, the flow of inert gas being so regulated that the gases leaving the stripping chamber contain a high percentage of free sulphur dioxide, passing the heated water from which the sulphur dioxide has been removed by the stripping process through the heat interchanger counter-current to the solution of sulphur dioxide coming from the dissolving chamber so as to partially cool the water and heat the solution, passing the partially cooled water through a cooler, passing the cooled water into the dissolving chamber for a repetition of the cycle, and passing the enriched gas from the stripping tower counter-current to the sulphite salt solution in the acid-making tower so as to form the finished sulphite acid containing a high concentration of free sulphur dioxide.

Cylinder Paper Making Machine

Patent No. 2,188,484. Guy M. Peterson, Springfield, Mass., assignor to Cheney Bigelow Wire Works, Springfield, Mass., a corporation of Massachusetts. Application May 6, 1937, Serial No. 141,121. 3 Claims. (Cl. 92—43). In a cylinder paper machine comprising a pulp vat, a paper making cylinder rotating therein, and a couch roll, said cylinder having an open interior devoid of axial shaft and radial bracing and being provided with internal bearing surfaces circularly disposed at the inner circumference of said cylinder, the combination therewith of a pair of spaced apart bearing rolls extending through said cylinder above its axis of rotation and in rolling engagement with the internal bearing surfaces of said cylinder for supporting said cylinder in its rotation, said bearing rolls being journaled in carrier members mounted exteriorly of said pulp vat, supporting standards, the carrier members for one of said bearing rolls being pivoted in said standards at the axis of rotation of said cylinder, and means for adjusting said carrier members about their pivotal support to vary the position of said bearing roll circumferentially within said cylinder.

Paper Making Machine

Patent No. 21,381. John P. Pederson, Battle Creek, Mich. Original No. 1,937,125, dated November 28, 1933, Serial No. 529,087, April 10, 1931. Application for reissue August 1, 1939, Serial No. 287,845. 37 Claims. (Cl. 92—44). The method of removing an endless wire screen from a machine of the Fourdrinier type, which consists in providing a movable support and a stationary support for the machine, and moving the movable support laterally with the screen while supporting the machine thereby.

Sized Paper

Patent No. 2,183,858. Joseph A. Warren, Westbrook, Maine, assignor to S. D. Warren Company, Boston, Mass., a corporation of Massachusetts. Application January 27, 1937, Serial No. 122,664. 4 Claims. (Cl. 92—40). An alkaline filled, uncoated paper, surface sized with a soya bean protein size, said size consisting essentially of soya bean protein.

Paper Manufacture

Patent No. 2,186,874. James O. Mason, Chillicothe, Ohio, assignor, by mesne assignments, to K-C-M Company, Dayton, Ohio, a corporation of Delaware. Continuation of application Serial No. 73,423, April 9, 1936. This application July 6, 1938, Serial No. 217,741. 6 Claims. (Cl. 92—40). Process in the manufacture of paper having controlled balanced quantities of mineral material incorporated in and upon the opposite sides thereof to produce a paper of superior finish characteristics adaptable for color reproduction and the like; which comprises flowing a fibrous stock containing mineral filler material onto a forming wire to form a web of paper, extracting moisture therefrom, passing the paper through press rolls to effect a moisture expressing pressure thereon, bringing a suspension of mineral filler material and adhesive into incorporating contact with the wire side thereof to incorporate a controlled amount of such mineral into the wire side of the sheet effective to produce a balancing of receptivity conditions of the opposite sides of the sheet with the wire side rendered comparable in receptivity characteristics with the top side, drying the paper to a condition of high moisture receptivity, and then bringing a suspension of paper coating mineral into incorporating contact with the opposite sides of said sheet under predetermined conditions of pressure to effect a balanced incorporation of the coating material into and upon the opposite sides of the sheet.

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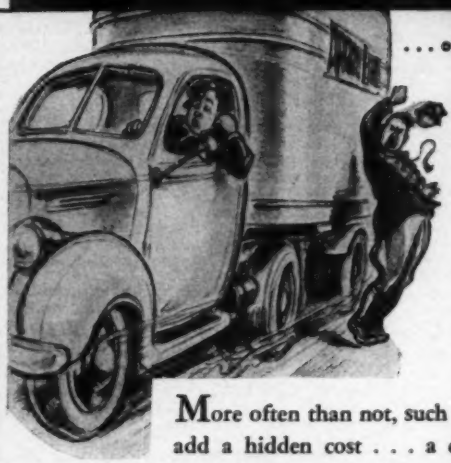

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New Catalogues and Publications

Allis-Chalmers Mfg., Milwaukee, Wis.—A four-page leaflet (R-6108) dealing with the effect of water conditions on the selection of pump materials has been issued lately by this company. The release points out the necessity of carefully investigating the type of water to be pumped and presents a number of factors in water that affect performance and service.

Black-Clawson Co., Hamilton, Ohio—An interesting folder describing and illustrating the B-C inching dryer drive has been published recently. Entitled "We Got Our Idea from a Freight Train," this new folder shows how this new drive operates on a new principle of starting in low speeds, then shifting to higher ones.

Carrier Corp., Syracuse, N. Y.—New "V" type refrigeration condensing units, both air and water cooled, are described in four booklets issued by this firm. The booklets illustrate and describe the operating features of the company's air cooled 2 hp. and 3 hp. sizes and the water cooled and evaporative 2, 3, 5, and 7½ hp. sizes. Data are included.

Cochrane Corp., Philadelphia—A new folder (2960) on this company's exhaust heads has been released lately. The release contains complete engineering data dimensions and list prices.

B. F. Goodrich Co., Akron, Ohio—A new 24-page catalogue, replete with illustrations and valuable data on its mechanical goods has been published recently by this company. The volume is a threefold one; a condensed catalogue, engineering data and a guide to selection of various products. There are data on pulley diameters, transmission belting horsepower, horsepower ratings, belt selection; discussions on hoses and fittings and other interesting material on packings, rubber mats, hard rubber sheet and pipe, rubber linings, pipes, rubber paints, cements, putty, rubber tape and other products.

Graton and Knight Co., Worcester, Mass.—An attractive 24-page catalogue on this company's leather belting has been published recently. The catalogue covers research leather belting, heart-oak and other brands of flat belting, round belting, belt installation and maintenance and selection of the belt. There is much valuable information to be found in this publication, including extensive operating data.

International Nickel Co., Inc., New York City—Data compiled from practice of 34 leading fabricators is contained within the sixteen pages of this interesting booklet, a reprint from *American Machinist*. The title of the booklet is "The Working of S. A. E. Nickel Alloy Steels." It covers effects of alloying elements, characteristics and applications, and heat treatments; also practical instructions for machining, drilling, etc.

D. O. James Mfg. Co., Chicago—Much valuable information relative to this company's motorized speed reducers is contained in Catalogue No. 18, recently published by this company. The 40-page book contains such data as service classifications and character of load, selection tables, dimensions, weights, mounting positions, in addition to cross-sectional drawings and installation photographs. This catalogue should be in every industrial library.

Kidder Press Co., Inc., Dover, N. H.—This company has issued a new four-page folder describing the Kidder line of slitters and roll winders. Complete information is given concerning the Super-Speed slitter and roll winder. Other models described are the C. W. model, a center wind machine; S.L.N. model, a lightweight shear cut surface winding machine and a Midget model for small rolls used in office machines.

Lincoln Electric Co., Cleveland—An attractive chart in color, giving uses, physical characteristics, etc., as well as currents and procedures for some thirty-six different electrodes has been issued lately by this company. The chart, available on request, will be of value to shop superintendents using welding.

Medart Co., St. Louis—This company's Catalogue No. 56-V contains extensive data on Medart V-sheaves and V-belts. The 38-page book includes price lists, dimensional tables, service factors, weights, etc. It is a book that should be in every industrial library.

Metropolitan Life Insurance Co., New York City—An interesting book entitled "Intensive Training of Industrial Employees" has been published recently by this company. The book gives details of how industry is streamlining training methods, cutting all waste and lost motion and, in general, stepping up the tempo without sacrificing the essentials of good training. Copies of this book are available from the company's policyholders service bureau, 1 Madison Avenue, New York City.

Michel Export Co., New York City—An interesting little booklet on "Alframine . . . A soapless soap," has been issued recently. The physical characteristics of this soap and its uses in various industries, including the paper industry, are well set forth in this handy little publication.

W. H. Nicholson & Co., Wilkes-Barre, Pa.—This company has just published a very interesting catalogue (No. 240) describing its steam traps and their uses. The bulletin uses well-written material and illustrations to good advantage in potraying the company's industrial steam traps, expansion steam traps, weight-operated traps, piston-operated traps and other products.

Pittsburgh Brass Mfg. Co., Pittsburgh—This company's Catalogue No. 3, contains data relative to the company's cocks, Tuyere fittings, Roto-Flex ball pipe joints, and other specialties. In addition to illustrating all products this catalogue also contains several pages of useful information such as measurement of water in pipes, friction of water in pipes, surfaces and capacities of pipes, and similar data. Prices are included.

Porter-Cable Machine Co., Syracuse, N. Y.—An attractive publication entitled, "How to Cut Costs and Increase Profits" has been published by this company. The manual contains a great amount of interesting material on this company's electric saw including its varied uses in various types of construction work. Specifications are included in this 21-page manual as are numerous photographs and drawings. Maintenance men will be interested in this publication.

Reliance Electric and Engineering Co., Cleveland—Two bulletins have been issued lately by this company. Bulletin 403 has to do with the company's single-reduction gear motors while Bulletin 404 has to do with the Reliance Type S gearmotors, double and triple reduction. Both bulletins are punched for loose-leaf filing and both contain drawings and photographs of the equipment as well as clearly-written material.

Republic Steel Corp., Cleveland—Four new booklets on Republic "Enduro" stainless steels have been released lately. These handsome booklets cover various types of these steels showing the entire analyses and average physical properties of each and illustrating how they can be used in various industries, including the pulp and paper industry. The booklets are extremely-well illustrated, containing dramatic photographs and exceptionally well-written literature. The layout of all four booklets tends to simplify the reading as does the good stock of paper used. There are extensive data included in these booklets, all of which are available from the company's advertising division in Cleveland.

Stephens-Adamson Mfg. Co., Aurora, Ill.—A new publication entitled "Labor Saver" has to do with this company's conveying material handling and screening machinery. The 20-page catalogue (Volume 135) shows installation views, has many illustrations, and much written material describing the operating features of the company's products.

Taylor Instrument Companies, Rochester, N. Y.—An interesting bulletin (98113) on this company's beater roll pressure recorders and controllers has been issued recently. Operating features of this equipment together with explanations of the types of control systems are brought out and two cross-sectional sketches are included.

Texas Gulf Sulphur Co., New York City—An extraordinarily interesting booklet entitled "Sulphur, an Essential to Industry and Agriculture," has been issued lately by this firm. A treatise on the properties and application of sulphur, this 45-page booklet presents the history, occurrence, production, economic considerations, properties, commercial forms, uses, and analysis of sulphur in a very complete and detailed though interesting manner. It contains extensive technical data as well as general reading matter. The booklet, reputedly the only one of its kind in the English language, should prove invaluable to teachers, students and specialists interested in sulphur.

United States Dept. of Agriculture, Bureau of Agricultural Chemistry and Engineering, Washington, D. C.—Just recently published is the new 1939-1940 Naval Stores Report which shows the production, distribution, consumption and stocks of turpentine and rosin of the United States. The report is a sixth of a series of annual reports and was compiled by C. F. Speh, Naval Stores Research Division.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—A very attractive, de luxe brochure entitled "Pyramids to Paper" has been released by this company. Spiral-bound in a unique embossed cover, this brochure dramatizes the use of Westinghouse equipment in the pulp and paper industry through 26 pages of excellent photographs and reading matter. The booklet covers the use of Westinghouse equipment from "log to shipping room" including power, pulp and papermaking, driving the paper machine, finishing the paper, etc. The brochure is very well laid out, contains considerable data and is valuable not only as a catalogue but as a reference work as well.

BOOKS

Phillips' Paper Trade Directory of the World (1940)—This volume is the fortieth edition of the well-known work. Printed and bound in its customary style, the book contains more than 800 pages of material. An important highlight of the volume is the section covering Spanish mills. This section has been revised with the co-operation of the Spanish Paper Mills Association. The book also includes a complete list of the waste paper merchants authorized by the Ministry of Supply (Paper Control) of Great Britain. S. C. Phillips & Company, 47 Cannon Street, London, E. C. 4, England, is its publisher. Its price is twenty-one shillings a copy, postage extra.

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Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

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This new Murray Flat Screen is one of a number in continuous operation for over a year in a leading paper mill without even a wrench being applied. Its capacity is greater, stock cleaner, power less than other types of equipment, aside from its minimum maintenance. This screen has a special drive developed to meet exacting and heavy-duty requirements at high speed—modern equipment for the mill that must improve quality and cut operation costs to meet competition. Repeat orders from users of the New Murray Flat Screens testify to satisfactory performance. The ideal screen for pulp, paper, roofing and board mills. Write for complete details.

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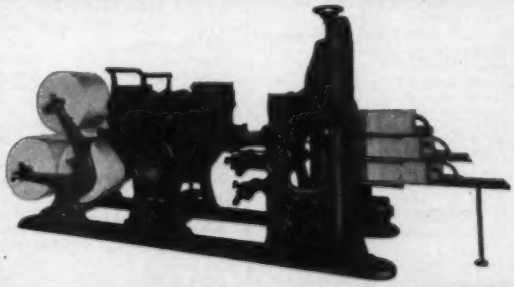

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It makes them all — plain, embossed and printed — quarter fold, dispenser fold, sixteenth fold and eighth fold. From 1,000 to 2,000 per minute — every napkin perfectly folded and delivered in a smooth, clean pack ready for wrapping. Used by every large producer in the United States and many foreign countries.

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CURRENT MARKET QUOTATIONS

RAGS (Domestic)
f. o. b. New York City

NEW RAGS

	per cwt.	
Blue Overalls	4.75 to	5.00
Corduroy	2.50 to	2.75
Cottons—		
Washables, No. 1	2.00 to	2.25
Fancy Percales	4.00 to	4.25
New Soft Blacks	3.50 to	3.75
New Light Seconds	1.75 to	2.00
New Dark Seconds	1.60 to	1.75
Khaki Cuttings—		
Mixed	2.75 to	3.00
O. D.	3.25 to	3.50
New Canvas	7.75 to	8.25
New Mixed Blacks	2.50 to	2.75
Shirt Cuttings—		
New White No. 1	7.25 to	7.50
Silesias No. 1	4.25 to	4.50
New Unbleached	7.00 to	7.25
Fancy	2.25 to	2.50

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

	per cwt.	
Roofing—		
No. 1	.90 to	.95
No. 2	.80 to	.85
No. 3	.70 to	.75
Twos and Blues—		
Repacked	1.60 to	1.75
Thirds and Blues—		
Repacked	1.40 to	1.50
Miscellaneous	1.10 to	1.20
White, No. 1—		
Repacked	3.00 to	3.25
Miscellaneous	2.75 to	3.00
White, No. 2—		
Repacked	2.50 to	2.75
Miscellaneous	2.00 to	2.25

RAGS (Foreign)
ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)
ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shoppers	

ROPE and BAGGING
f. o. b. and ex dock New York City

	per cwt.	
Gunny No. 1—		
Foreign	2.40 to	2.50
Domestic	2.40 to	2.50
Wool Tares—		
Light	2.25 to	2.35
Heavy	2.40 to	2.50
No. 1 Scrap Bagging	2.10 to	2.25
Manila Rope—		
Foreign	4.25 to	4.50
Domestic	4.25 to	4.50
New Burlap Cuttings	3.25 to	3.50
Jute Threads—		
Foreign	3.25 to	3.50
Domestic	3.00 to	3.25
Strings—		
Sisal	2.25 to	2.50
Soft jute	3.25 to	3.50
Mixed	1.10 to	1.25

WASTE PAPER
f. o. b. New York City

	per cwt.	
Shavings—		
White Envp. Cuttings	3.40 to	3.60
Ord. Hard White No. 1	2.75 to	3.00
Ord. Soft White No. 1	2.40 to	2.60
Soft White, Extra	3.00 to	3.25
Flat Stock—		
Stitchless	1.40 to	1.50
Overissue Mags	1.20 to	1.30
Solid Flat Book	1.10 to	1.30
Crumpled No. 1	.95 to	1.00
Solid Ledger Books	2.20 to	2.30
Ledger Stock—		
White	2.10 to	2.25
Colored	1.60 to	1.75
New B. B. Chips	.50 to	.55
Manilas—		
New Env. Cuts	2.75 to	3.00
New Cuttings	2.15 to	2.30
Sulphite Mill Wrappers	.55 to	.60
No. 1 Old Kraft	1.75 to	2.00
News—		
No. 1 Wh. News Cuttings	1.75 to	1.90
Strictly Overissue	.70 to	.80
Strictly Folded	.60 to	.65
No. 1 Mixed Paper	.45 to	.50

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—		
Lump, cwt.	3.75 -	
Ground, cwt.	3.50 -	
Powdered, cwt.	3.90 -	
Blanc Fixe—		
Pulp, bulk, ton	35.00 to	40.00
Dry, barrels, pound	.0300 to	.0400
Bleaching Powder—		
Drums, cwt.	2.00 to	3.00
Casein (Domestic Standard)—		
20-30 mesh (bags), lb.	13.00 to	14.00
80-100 mesh (bags), lb.	14.00 to	15.00
Argentine, lb.	11.00 to	12.00
China Clay—		
Domestic Filler		
Bulk (mine) ton	7.50 to	15.00
Domestic Coating		
Bulk (mine) ton	11.00 to	22.00
Imported (ship side)		
Bulk (lump) ton	13.00 to	25.00
Chlorine—		
Tank cars (wks) cwt.	1.75 to	1.90
Gelatine (silicin), lb.	.53 to	.55
Glye. (C.P.) drums, lb.	.1250 to	.1300
Litharge, powd., bbl., lb.	.0775 to	.0800
Rosin (Gum)—		
New York, 280 lb. barrel		
E, per bbl.		4.95
F, per bbl.		5.35
G, per bbl.		5.35
WW, per bbl.		7.05
Rosin (Wood), per bbl., carlots	3.25 to	3.65
Salt Cake—		
Dom. bulk (wks) ton	16.00 to	17.00
Imp. bulk on dock—		
(Atl. ports) ton	20.00 to	
Soda Ash—		
Bulk (works) cwt.	.90 to	.95
Paper Bags, cwt.	1.05 to	1.35
Barrels, cwt.	1.05 to	1.35
Soda (Caustic)—Ammonia,		
Solid, drums, cwt.	2.30 -	
Ground and flake, drums, cwt.	2.75 -	
Sodium Silicate—		
60 deg., 55 gal. drums, (works) cwt.	1.65 to	2.00
40 deg., 55 gal. drums, (works) cwt.	.80 to	1.20
Starch—		
Pearl, 140 lb. bags, cwt.	2.80 -	
Pearl, barrels, cwt.	2.90 -	
Paper (Sp.) bags, cwt.	2.90 -	
barrels, cwt.	3.00 -	
Sulphur (crude)—		
(mine) bulk, long ton	16.00 to	20.50
Talc—		
Dom. 100 lb. bags (mine) ton	14.00 to	17.25
Imp. bulk, ton	23.00 to -	
Titanium Dioxide—		
Barium Pig., bbls., lb.	.05¼ to	.05½
Calcium Pig., bbls., lb.	.05 to	.05¼
Zinc Sulphide, bbls., lb.	.07½ to	.07¾

CHEMICAL PULP
(Air-dry ton)

	per cwt.	
Soda (Dom.) del'd. mill—		
Bleached, contract	3.50 -	
Open market	3.40 -	
Sulphate (Dom.) f. o. b. mill—		
Bleached	4.00 to	4.25
Kraft No. 1	3.00 to	3.25
Kraft, Southern, del.	3.00 to	3.25
Sulphate (Imp.) on dock—		
Bleached	4.50 to	4.75
Kraft No. 1	3.50 to	3.75
Kraft No. 2	3.25 to	3.50
Sulphite (For.)		
On dock—		
Prime bleached	4.00 to	4.25
Prime easy bleach	3.75 to	4.00
Prime strong unbl.	3.50 to	3.75
Sulphite (Dom.)		
Bleached, contract	3.62½ -	
Bleached, open market	3.75 -	
Unbleached, contract	3.17½ to	3.37½
Unbleached, open market	3.25 -	

MECHANICAL PULP
(Air-dry ton)

No. 1 Dom. & Can. (f. o. b. pulp mill)	per ton 34.00 to	37.00
No. 1 Imp. (On dock)—		
Moist	(nominal) 43.00 to	48.00
Dry	(nominal) 45.00 to	50.00

PAPER
f. o. b. New York City

	per ton	
Boards—		
Binders	75.00 to	80.00
Chip	40.00 to	45.00
Chip, egl. mla. lined	55.00 to	60.00
Coated, white patent		
.016	77.50 -	
.020 and heavier	72.50 -	
Kraft liner	55.00 -	
News	40.00 to	45.00

	per cwt.	
Book (easel)		
No. 1 Glossy Coat	11.50 to	13.50
No. 2 Glossy Coat	10.35 to	11.75
No. 3 Glossy Coat	9.55 to	11.00
No. 4 Glossy Coat	9.15 to	10.50
No. 2 Offset	7.70 to	9.00
A Grade M. F.	6.40 to	7.15
A Grade Super	6.65 to	7.40
B Grade M. F.	5.95 to	6.70
B Grade Super	6.20 to	6.95
B S. & S. C. Litho	6.45 to	7.20
B M. F. Litho	6.20 to	6.95
Ivory & India	.50 cwt.	extra
Bonds (Rag Content)—		
100% Rag		
Ext. No. 1	39.10 to	46.00
100% Rag	31.05 to	36.80
85% Rag		
75% Rag	23.80 to	27.75
65% Rag	20.50 to	25.00
50% Rag	17.55 to	21.50
25% Rag	14.65 to	17.75
Regular Colors	1.00 cwt.	extra

	per cwt.	
Bonds (Sulphite)—		
No. 1	8.95 to	11.00
No. 2	8.05 to	9.75
No. 3	7.60 to	9.25
No. 4	7.30 to	9.00
Colors	1.00 cwt.	extra
Glassine (f. o. b. mill)—		
Embossed (25 lb. up)	13.75 to	14.00
Bleached (25 lb. up)	12.75 to	12.87½
Unbleach. (25 lb. up)	11.00 to	11.25
Greaseproof—		
Bleach. (25 lb. up)	10.50 to	10.75
Unbleach. (25 lb. up)	9.50 to	9.75
Ledgers (Rag Content)—		
100% Rag		
Ext. No. 1	40.25 to	47.25
100% Rag	32.20 to	37.75
85% Rag	29.90 to	35.00
75% Rag	24.75 to	29.00
65% Rag	21.65 to	26.25
50% Rag	18.70 to	22.75
25% Rag	15.80 to	19.25
Regular Colors	1.00 cwt.	extra
Ledgers (Sulphite)—		
No. 1	10.10 to	12.25
No. 2	9.25 to	11.25
No. 3	8.50 to	10.75
No. 4	8.50 to	10.25

	per ton	
News—		
Rolls (Contract)	49.00 to	50.00
Rolls (Spot)	(nominal)	
Sheets	58.00 -	

	per ream	
Tissues (Carlots)—		
White, No. 1	.92½ -	
White, No. 2	.65 -	
Anti-Tarnish M. G.	.80 -	
Colored	.87½ -	
Kraft	.80 -	
Manila	.65 -	
Napkins, semi-crepe (12¾ lb. to M shts.) per cs.	.41 -	
Napkins, full crepe and emb'sed (12¾ lb. to M shts.) per cs.	.43½ -	
Toilet, Bleached (M shts.) per cs.	5.80 -	
Toilet, Unbleached (M shts.) per cs.	3.50 -	

	per case	
Towels—		
Bleached	3.10 to	3.65
Unbleached	1.95 to	3.30

	per cwt.	
Wrappings (Kraft)—		
Extra Quality	5.25 to	5.75
Super-Standard	4.87½ to	5.25
Northern Standard	4.25 to	4.75
Southern Standard	4.25 to	4.75
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)		
Bleached papers—		
M.F. & M.G. Waxing, 20 lb. (Carloads only)	per cwt 6.40 to	6.50
(10,000 lbs.)	6.60 to	6.90
Drug wrapp. 35 lb.	6.25 to	6.50
Unbleached Papers—		
Com. Grd. Butch. 40 lb.	4.62½ -	
No. 1 Butchers	5.00 -	
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	5.25 -	
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	5.00 -	
Steam Finish, 50 lb.	4.00 -	
Water Finish, 40 lb.	4.75 -	
Manilas—		
Envp. Mls., Sub. 16-40 (No. 1)	5.25 -	
Envp. Mls., Sub. 16-28 (No. 2)	5.00 -	
Envp. Mls. (Prices based on large sheets untrim'd ream-marked, in bdls.)		
Wrapp. Mls. 35 lb. up—		
No. 1	5.25 -	
No. 2	5.00 -	
M. G. Sulphite and Kraft (other than Waxing)		
Grade A-25 lb.	6.00 -	
Grade B-25 lb.	5.50 -	